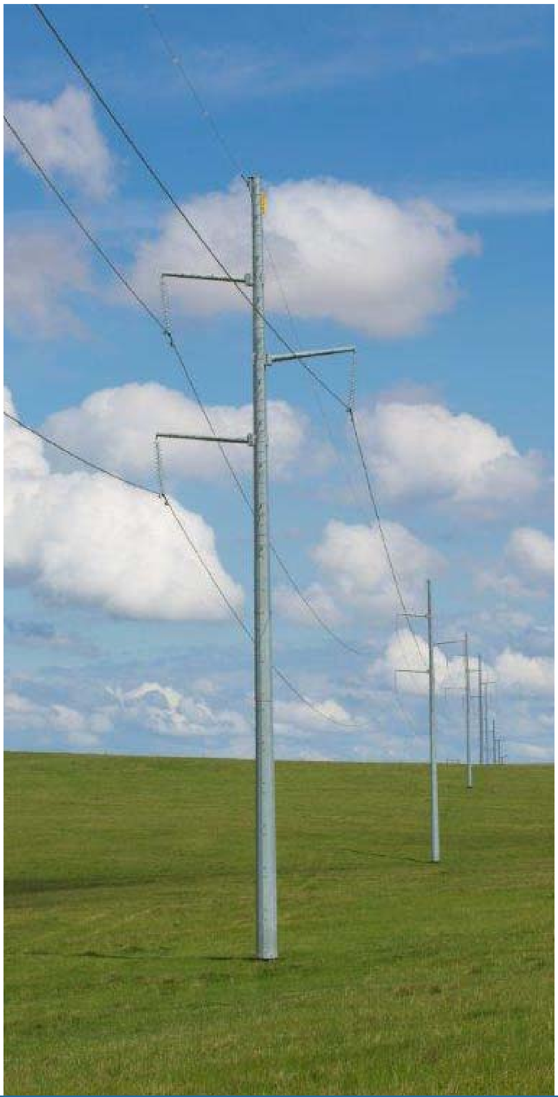
Antelope Valley Station to Neset Transmission Project

Supplemental Draft Environmental Impact Statement

December 2013

Prepared for:
U.S. Department of Agriculture, Rural Utilities Service
Cooperating Agencies:
Western Area Power Administration
U.S. Forest Service


USDA Rural Development

Western Area Power Administration

Forest Service U.S. Department of Agriculture

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Antelope Valley Station to Neset Transmission Project

Responsible Federal Agency (Lead): U.S. Department of Agriculture, Rural Utilities Service

Cooperating Agencies: Western Area Power Administration and the U.S. Department of Agriculture, Forest Service

Responsible State Agency: North Dakota Public Service Commission

Title: Antelope Valley Station to Neset Transmission Project, Supplemental Draft Environmental Impact Statement

Location: Central and Western North Dakota

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Abstract

In November 2012, the U.S. Department of Agriculture (USDA), Rural Utilities Service (RUS) issued a Draft Environmental Impact Statement (DEIS) evaluating the environmental implications of Basin Electric Power Cooperative's (Basin Electric) Antelope Valley Station (AVS) to Neset Transmission Project. The originally proposed project, as evaluated in the DEIS, considered the development of a single 345-kilovolt (kV) transmission line and two new substations in one of two alternative routes. The project was proposed to increase transmission line capacity to meet the expected increase in load. However, the new load forecasts show the load increasing above and beyond the original forecast by nearly 50 percent (Kardmas, Lee & Jackson, Inc. [KLJ], 2012). Therefore the original project as described in the DEIS would not achieve capacity needs or reliability standards.

RUS made the decision to prepare a Supplemental Draft Environmental Impact Statement (Supplemental DEIS) for the AVS to Neset Transmission Project to evaluate project changes that have occurred since the DEIS was published and the comment period closed. To efficiently and reliably meet the increased demand projections, additional alternatives, including building a transmission line on both routes A and B, parallel and double circuit lines on the route B, and additional substation and switchyard components are evaluated in this Supplemental DEIS.

In addition to complying with all applicable federal regulations, several permits and approvals must be granted by the state of North Dakota prior to construction. The North Dakota Public Service Commission (NDPSC) must grant a Certificate of Corridor Compatibility and a Route Permit in accordance with North Dakota Century Code.

Basin Electric has requested financial assistance from RUS to construct the project. RUS has determined that its decision about whether to finance the project would constitute a major federal action that may have a significant impact on the environment within the context of the National Environmental Policy Act of 1969 (NEPA). RUS serves as the lead federal agency for the NEPA environmental review of the project.

Basin Electric, RUS, and Western held public scoping meetings on November 15 and 16, 2011. These meetings were held in Williston and Killdeer, North Dakota.

Basin Electric and RUS will hold a public hearing on the Supplemental DEIS. It is expected that this meeting will occur in Watford City, North Dakota in January 2014. The public is encouraged to provide oral comments at the public meetings and to submit written comments to RUS by the end of the 45 day comment period. This Supplemental DEIS evaluates the environmental consequences that may result from the proposed action for each of the alternatives. In addition, the Supplemental DEIS also analyzes the no-action alternative, under which RUS would not approve financial assistance for the project.

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ACRONYMS AND ABBREVIATIONS

APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
AVS	Antelope Valley Station
BA	Biological Assessment
Basin Electric	Basin Electric Power Cooperative
BLM	Bureau of Land Management
BMP	best management practice
BNSF	BNSF Railway Company
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO2	carbon dioxide
CO2e	carbon dioxide equivalent
CWA	Clean Water Act
dBA	A-weighted decibel
DEIS	draft environmental impact statement
EMF	electric and magnetic field
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIRM	Flood Insurance Rate Maps
GHG	greenhouse gases
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IS	Integrated System

KLJ	Kardmas, Lee & Jackson, Inc.
kV	kilovolt
kV/m	kilovolts per meter
LMNG	Little Missouri National Grasslands
μT	microtesla
mG	milligauss
MIS	Management Indicator Species
MRO	Midwest Reliability Organization
MW	megawatts
MWEC	Mountrail-Williams Electric Cooperative
NDDMR	North Dakota Department of Mineral Resources
NDGFD	North Dakota Game and Fish Department
NDPSC	North Dakota Public Service Commission
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NHPA	National Historic Preservation Act
NO_x	nitrogen oxide
North Dakota SHPO	North Dakota State Historic Preservation Office
NPS	U.S. Department of the Interior, National Park Service
NRCS	U.S. Department of Agriculture, Natural Resources Conservation Service
NWI	National Wetlands Inventory
OHGW	overhead groundwire
OPGW	optical groundwire
PM_{10}	particles with a diameter less than or equal to a nominal 10 micrometers
$PM_{2.5}$	particles with a diameter less than or equal to a nominal 2.5 micrometers

ROW	right-of-way
RUS	U.S. Department of Agriculture, Rural Utilities Service
SIO	scenic integrity objective
SRST	Standing Rock Sioux Tribe
SUP	Special Use Permit
Supplemental DEIS	Supplemental Draft Environmental Impact Statement
SWO	Sisseton Wahpeton Oyate
TRNP	Theodore Roosevelt National Park
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Department of the Interior, Fish and Wildlife Service
USGS	U.S. Department of the Interior, U.S. Geological Survey
Western	U.S. Department of Energy, Western Area Power Administration
WMA	wildlife management area

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EXECUTIVE SUMMARY

In November 2012, the U.S. Department of Agriculture (USDA), Rural Utilities Service (RUS) issued a Draft Environmental Impact Statement (DEIS) evaluating the environmental implications of Basin Electric Power Cooperative's (Basin Electric) Antelope Valley Station (AVS) to Neset Transmission Project. The originally proposed project, as evaluated in the DEIS, considered the development of a single 345-kilovolt (kV) transmission line and two new substations in one of two alternative routes. The project was proposed to increase transmission line capacity to meet the expected increase in load. However, the new load forecasts show the load increasing above and beyond the original forecast by nearly 50 percent (Kardmas, Lee & Jackson, Inc. [KLJ], 2012). Therefore the original project as described in the DEIS would not achieve capacity needs or reliability standards.

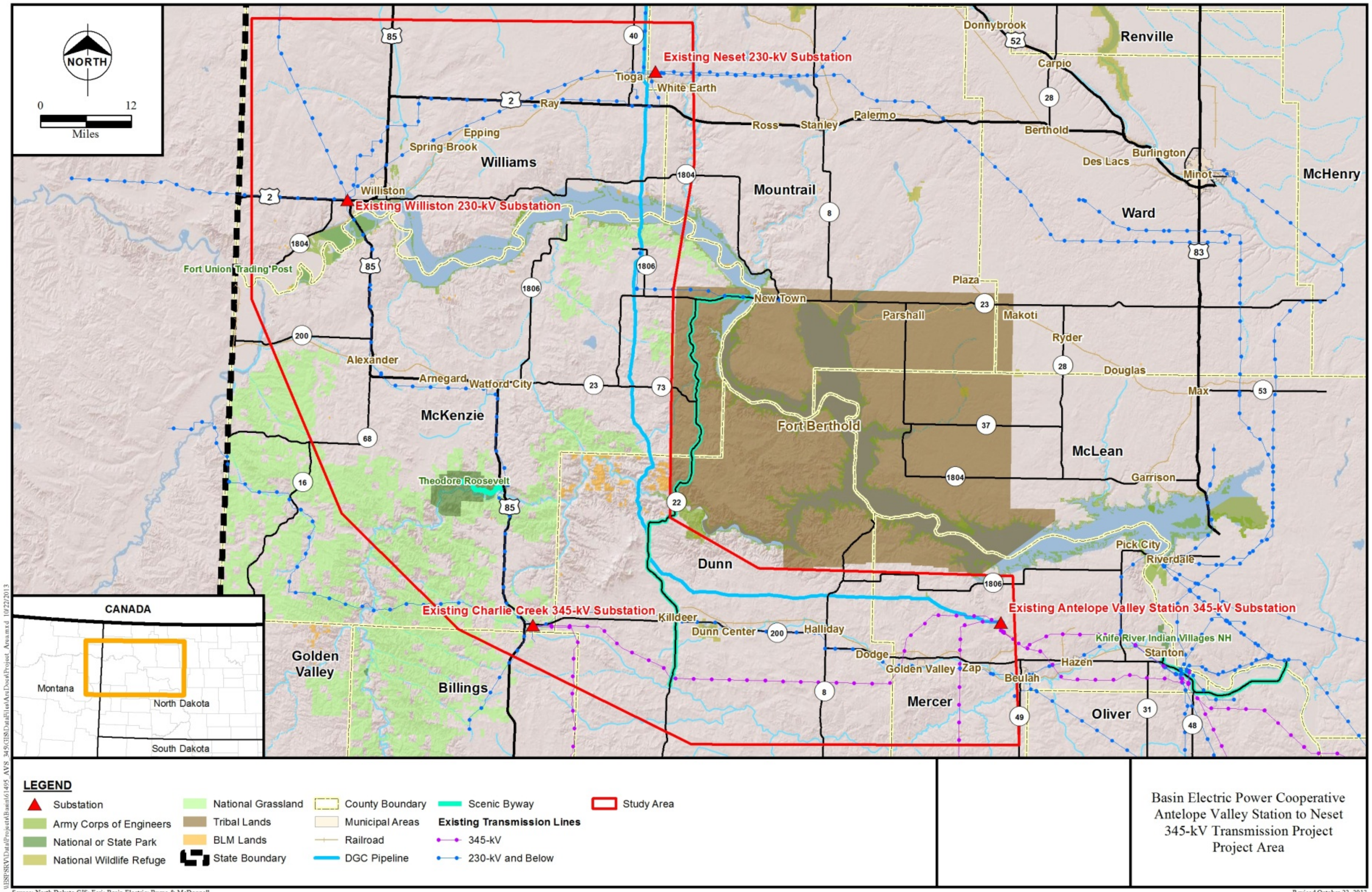
RUS made the decision to prepare a Supplemental Draft Environmental Impact Statement (Supplemental DEIS) for the AVS to Neset Transmission Project to evaluate project changes that have occurred since the DEIS was published and the comment period closed. To efficiently and reliably meet the increased demand projections, additional alternatives, including building a transmission line on both routes A and B, parallel and double circuit lines on the route B, and additional substation and switchyard components are evaluated in this Supplemental DEIS.

This executive summary provides a description of the proposed project and the alternatives evaluated. It also provides a brief summary of findings, highlighting conclusions, areas of controversy, and issues to be resolved.

PROJECT INTRODUCTION

Basin Electric proposes to construct, operate, and maintain a new, approximately 278 mile, electrical transmission line connecting the existing AVS, Charlie Creek, Williston, and Neset substations with four newly proposed delivery substations and one switchyard. The number of miles of line could increase to up to 314 miles with an additional 345-kV switchyard depending on the alternative selected. The overall project area identified for this project encompasses parts of Mercer, Dunn, McKenzie, Williams, and Mountrail counties in North Dakota, and is shown in Figure ES-1.

Figure ES-1: Project Area



The new 345-kV transmission line would start at the AVS electric generation facility near Beulah, North Dakota and extend west where it would connect with Basin Electric's existing Charlie Creek 345-kV Substation near Grassy Butte. The line would then extend north where it would connect with Basin Electric's proposed Judson 345-kV Substation near Williston and terminate at Basin Electric's newly proposed Tande 345-kV Substation. Additional 230-kV transmission lines would be constructed between the new Judson Substation and the existing U.S. Department of Energy, Western Area Power Administration's (Western) Williston Substation, between a new 345/230/115-kV substation, referred to as the Blue Substation, and Western's existing 230-kV transmission line, and also between the new Tande Substation and Basin Electric's existing Neset 230-kV Substation near Tioga, North Dakota.

The proposed segments and lengths of the overall project are described in the following paragraphs. The project would include a 61-mile, 345-kV line from the AVS Substation to the existing Charlie Creek Substation. A new 345-kV switchyard, referred to as the Red Switchyard, would be constructed along this segment of the transmission line in the Killdeer area to connect a 63-mile, 345-kV line to a new 345/115-kV Substation (referred to as the White Substation) and the Blue Substation. The Charlie Creek Substation would also be connected by a 51-mile segment to the new Blue Substation. The Blue Substation would be located south of the Missouri River to connect the 345-kV transmission line with Western's 230-kV transmission line. Approximately 10 miles of 230-kV line would connect the Blue Substation with the existing 230-kV Western transmission line. A 345/115-kV substation would also be located at the Blue Substation location to connect to the local 115-kV system. The interconnections described above would provide a delivery loop within the Williston Load Pocket area. This delivery loop provides connections to the local 115-kV system and a reliable power delivery to the McKenzie County load delivery area.

The White Substation would be constructed along the Red Switchyard to the Blue Substation transmission line segment to interconnect with the local 115-kV system for load-serving purposes. A single 345-kV transmission line would extend approximately 24 miles north from the Blue Substation to the proposed Judson Substation near Williston. The Judson Substation would then interconnect with the proposed Tande Substation by a 61-mile line segment (including approximately 31 miles of double circuit with Mountrail-Williams Electric Cooperative [MWEC] 115-kV line) and a 2-mile 230-kV transmission line would interconnect the proposed Judson Substation to Western's existing Williston 230/115-kV Substation. Finally, the proposed Tande Substation would interconnect with the existing Neset Substation by a 1-mile, 230-kV line segment. Table ES-1 describes the components of the alternatives included in this Supplemental DEIS.

Table ES-1: Components of Project Alternatives

		Alternative C	Alternative D	Alternative E
Transmission Line Segments	**Kilovolts (kV)**	**Miles**	**Miles**	**Miles**
AVS Substation to Red Switchyard	345	45	45	45
Red Switchyard to Charlie Creek Switchyard	345	21	21	21
Red Switchyard to Killdeer South Switchyard	345	N/A	24	24
Charlie Creek Substation to Blue Substation	345	51	N/A	N/A
Red Switchyard to White Substation	345	27	27	54
White Substation to Blue Substation	345	36	36	72
Blue Substation to Western's 230kV Line	230	10	10	10
Blue Substation to Judson Substation	345	24	24	24
Judson Substation to Williston Substation	230	2	2	2
Judson Substation to Tande Substation	345	61	61	61
Tande Substation to Neset Substation	230	1	1	1
Total miles		**278**	**251**	**314**
Substations/Switchyards				
		Acres	**Acres**	**Acres**
AVS Substation (345-kV)	Existing	19	19	19
Red Switchyard (345-kV)	Proposed	12	12	12
Charlie Creek Substation (345/230/115-kV)	Existing	10	10	10
White Substation (345/115-kV)	Proposed	12	12	12
Blue Substation (345/230/115-kV)	Proposed	25	25	25
Judson Substation (345/230-kV)	Proposed	12	12	12
Williston Substation (230/115-kV)	Existing	9	9	9
Tande Substation (345/230-kV)	Proposed	12	12	12
Neset Substation (230/115-kV)	Existing	8	8	8
Killdeer South Switchyard (345-kV)	Proposed	N/A	12	12

The Supplemental DEIS considers two additional alternatives, similar to the project alignment discussed above. The primary difference would be either a double-circuit 345-kV line (Alternative D) or two parallel lines (Alternative E) running 63 miles from the Red Switchyard near Killdeer to the new White Substation and on to the new Blue Substation with an additional Killdeer South Switchyard. The Killdeer South Switchyard would interconnect the Red Switchyard to the existing AVS to Charlie Creek 345-kV transmission line by 12 miles of parallel 345-kV single-circuit transmission line.

LEAD AGENCY - UNITED STATES DEPARTMENT OF AGRICULTURE, RURAL UTILITIES SERVICE

Basin Electric is requesting financial assistance from RUS to construct the project. RUS has determined that the agency's decision about whether to finance the project would constitute a major federal action that may have a significant impact on the environment within the context of the National Environmental Policy Act of 1969 (NEPA). Therefore, RUS is serving as the lead federal agency for the NEPA environmental review of the project.

As lead agency, RUS has prepared this Supplemental DEIS in compliance with the requirements of NEPA and the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508).

RUS's agency actions include the following:

- Provide engineering reviews of the purpose and need, engineering feasibility, and cost of the proposed project.
- Ensure that the proposed project meets the borrower's requirements and prudent utility practices.
- Evaluate the financial ability of the borrower to repay its potential financial obligations to RUS.
- Review and study the alternatives to mitigate and improve transmission reliability issues.
- Ensure that adequate transmission service and capacity are available to meet the proposed project needs.
- Ensure that NEPA and other environmental requirements and RUS environmental policies and procedures are satisfied prior to taking a federal action.

COOPERATING FEDERAL AGENCIES

Western and the USDA, Forest Service (USFS) have agreed to assist RUS as cooperating agencies in preparing this Environmental Impact Statement. The roles of these agencies are described below.

Western Area Power Administration

Basin Electric is requesting to interconnect its proposed project with Western's Williston Substation and Western's Williston to Charlie Creek 230-kV transmission line. Western must consider the interconnection request in accordance with its General Requirements for Interconnection and the Federal Power Act (FPA).

Western is also serving as the lead federal agency for compliance with Section 106 of the National Historic Preservation Act (NHPA) for cultural resources and for consultation regarding Section 7 of the Endangered Species Act (ESA).

U.S. Forest Service

USFS has proposed to authorize and subsequently issue a Special Use Permit (SUP) under the Federal Land Policy and Management Act, with terms and conditions for the construction, maintenance, and operation of a transmission line through lands administered by USFS on the Little Missouri National Grassland (LMNG).

PURPOSE AND NEED FOR ACTION

Basin Electric proposes to construct, operate, and maintain the project in order to meet projected future electric demand and to maintain electric transmission reliability standards in accordance with the requirements of the North American Reliability Council (NERC). The existing high voltage system in the Williston/Tioga region consists of 230-kV and 115-kV systems that connect to Saskatchewan, Canada; eastern Montana; central North Dakota; and western North Dakota. Outages of any of these paths could cause low voltage criteria violations and overload adjacent transmission lines in the Williston/Tioga region and therefore be in violation of NERC reliability standards.

Basin Electric's August 2011 load forecast indicates an acceleration of growth in the northwestern North Dakota area primarily as a result of oil development of the Bakken Formation (Basin Electric, 2011). Much of the short-term load growth in this area is associated with provision of electrical service to support the rapid expansion of the number of facilities for oil and natural gas production, as well as the supporting infrastructure and services.

The Bakken shale development is currently concentrated in McKenzie, Mountrail, and Williams counties. The level of development that has occurred and is planned for the future will require an increase in electrical transmission capacity and reliability. Initially, studies of power supply for the region and the upper Midwest determined that one 345-kV transmission line would be sufficient to meet future growth and this was the basis for the DEIS. However, current development forecasts are causing load growth forecasts to be revised (KLJ, 2012).

Basin Electric concluded that to meet the revised load forecasts, the AVS to Neset Transmission Project would need to include an additional 345-kV line in McKenzie County. In the region, demand for electric power from the oil industry alone is projected to increase from 9 to 22 percent of Basin Electric's overall power production by 2025. The demand from large commercial operations follows a similar increase as it supports the oil and gas industry. This project would address system capacity issues resulting from rapid growth in the area. In reassessing project need, Basin Electric determined that the single 345-kV line from AVS to Killdeer and from south of Williston to Tioga would not be sufficient to meet the original projected need. Based on the new load forecast, two 345-kV lines would be required in the middle of the project, one from Charlie Creek to south of Williston (previously proposed) and one from Killdeer to south of Williston (new).

REGULATORY FRAMEWORK

The following sections summarize the primary framework that provides the regulatory basis for each federal and state agency's role in approving Basin Electric's project and guides the permitting process.

National Environmental Policy Act

NEPA requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of, and reasonable alternatives to, their proposed actions. For major federal actions that have the potential to cause significant adverse impacts on the environment, NEPA requires agencies undertaking the action to prepare an EIS.

RUS has determined that providing financial assistance for the construction and operation of the project constitutes a major federal action that may significantly affect the quality of the natural and human environment. Therefore, the EIS process is underway in accordance with 7 CFR 1794 Subpart G - Procedure for Environmental Impact Statement.

Clean Water Act

Clean Water Act (CWA) Section 404 authorizations may be required for the project, because its construction may result in discharge of dredged and/or fill material into waters of the United States. The U.S. Army Corps of Engineers (USACE) is the agency responsible for determining whether to issue a permit for wetland impacts associated with the project. Receipt of a Section 404 permit and adherence to the terms and conditions of the permit, including any associated compensatory mitigation and best management practices (BMPs) to reduce sedimentation and erosion control, would demonstrate the project's compliance with the CWA. Specific permit conditions, including the quantity or extent of compensatory mitigation and specific BMPs, would be determined by USACE after a project alternative has been selected. Field inspections of the project would evaluate and verify compliance with permits and the CWA.

Endangered Species Act

The ESA of 1973 designates and provides for the protection of threatened and endangered plants and animals and their critical habitat. For the proposed project, Western is acting as the lead agency for Section 7 consultation under the ESA. It is Western's responsibility to consult with the U.S. Department of the Interior, Fish and Wildlife Service (USFWS) to establish a list of protected species; prepare a Biological Assessment (BA) of the potential for the proposed project to adversely affect listed species; provide coordination between state and federal biological resource agencies to assess impacts and propose mitigation; and develop appropriate mitigation strategies for all adverse impacts on federally listed species. If Western determines in its BA that threatened or endangered species would be adversely affected by the project, it would need to request formal consultation with USFWS. USFWS would review the information in the BA and develop a Biological Opinion as to whether or not the proposed project would likely result in jeopardy to the species adversely affected.

National Historic Preservation Act

Section 106 of NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and seek to accommodate historic preservation concerns through consultation among the agency officials and other parties. The goal of consultation is to identify historic properties potentially affected by the undertaking; assess effects; and seek ways to avoid, minimize, or mitigate any adverse effects on historic properties. Western is acting as the lead agency in consultation with the North Dakota State Historic Preservation Office, Native American tribes, and federal and state permitting agencies.

Energy Policy Act

The Energy Policy Act of 2005 granted the Federal Energy Regulatory Commission (FERC) the authority to impose mandatory reliability standards on transmission systems. To accomplish this, FERC designated NERC as the Electric Reliability Organization (ERO) with the authority to establish, approve, and enforce the reliability standards. NERC then delegated the authority for proposing and enforcing the reliability standards to particular regions. For the Basin Electric service area, the Midwestern Reliability Organization (MRO) was designated. The MRO accomplishes its monitoring and enforcement obligations by designating Reliability Coordinators. For the Basin Electric service area, the designated Reliability Coordinator is the Integrated System (IS). It is the responsibility of the IS to adhere to the reliability standards by providing a high-voltage transmission system grid in the region of eastern Montana, North Dakota, and South Dakota.

North Dakota Energy Conversion and Transmission Facility Siting Act

The North Dakota Energy Conversion and Transmission Facility Siting Act states that it is necessary to ensure that the location, construction, and operation of energy conversion facilities and transmission facilities will produce minimal adverse effects on the environment and on the welfare of the citizens of the state by providing that no energy conversion facility or transmission facility shall be located, constructed, and operated within North Dakota without a certificate of site compatibility or a route permit acquired pursuant to Chapter 49-22 of the North Dakota Century Code (North Dakota Century Code, 2011a). It is state policy to site energy conversion facilities and to route transmission facilities in an orderly manner compatible with environmental preservation and the efficient use of resources. According to the Act, sites and routes shall be chosen to minimize adverse human and environmental impacts while ensuring continuing system reliability and integrity and ensuring that energy needs are met and fulfilled in an orderly and timely fashion.

PROPOSED ACTION, ALTERNATIVES, AND SCOPE OF THE EIS

Basin Electric proposes to construct, operate, and maintain approximately 278 miles of transmission line, including 265 miles of new 345-kV electrical line and 13 miles of new 230-kV line, four new substations, one switchyard, and equipment additions, but no expansion to four existing substations. The overall project area identified for this project encompasses parts of Mercer, Dunn, McKenzie, Williams, and Mountrail counties in North Dakota.

In the DEIS, two route alternatives, A and B, along with a no-action alternative, were considered and evaluated. However, the increased electricity demand projections require more transmission line development to meet the need for the project, particularly in McKenzie County. As a result, a single transmission line constructed on either alternatives A or B no longer meets the project's purpose and need; therefore, these alternatives were eliminated from further consideration. To efficiently and reliably meet the increasing load demand projections, Basin Electric would need to construct additional transmission capacity, a new interconnection with Western's Williston to Charlie Creek 230-kV transmission line, at least one new 345/345-kV switchyard (depending on the alternative selected), and two 345/115-kV load-serving substations. Three alternatives were developed and the no-action alternative was retained for full evaluation in this Supplemental DEIS. This section provides an overview of these alternatives as well as their potential impacts and mitigation measures.

Three alternatives that would meet these requirements are evaluated in this Supplemental DEIS. Alternative C combines Alternative A, McKenzie County portions of Alternative B from the DEIS, one new switchyard (Red Switchyard), and two load-serving substations (the White and Blue substations). Alternative D is a modification of Alternative B, with the primary differences being the construction of 345/345-kV double-circuit lines north of Killdeer for 63 miles and the addition of the Red Switchyard and White and Blue substations, also included in Alternative C. Alternative E is similar to Alternative D except that it includes the construction of two single-circuit 345-kV lines running parallel north of Killdeer for 63 miles. Both alternatives D and E would require constructing an approximately 12-mile interconnection of two single-circuit 345-kV lines running parallel between the Red Switchyard and the Killdeer South Switchyard on the existing AVS to Charlie Creek 345-kV transmission line.

No-action Alternative

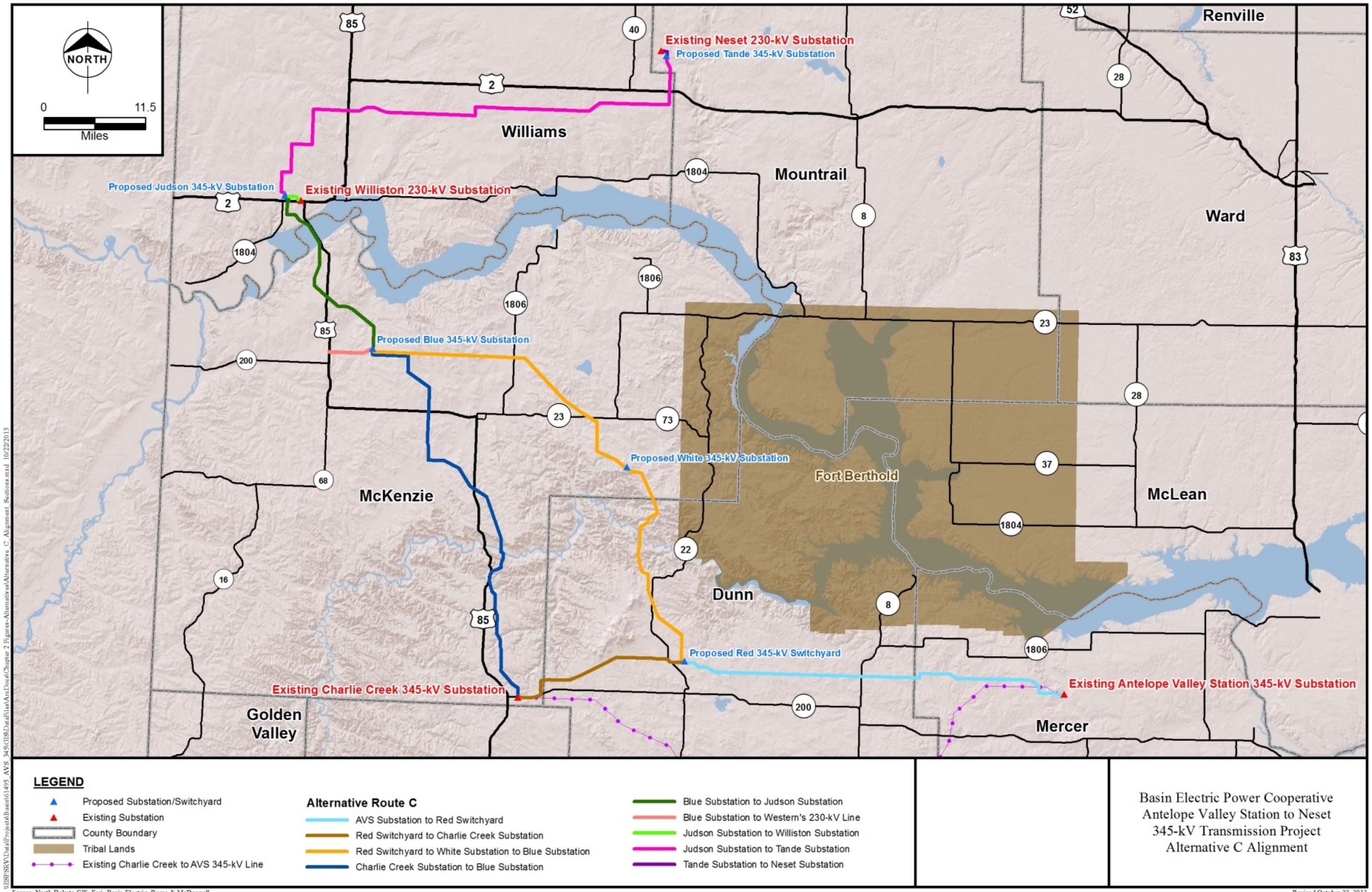
Under the no-action alternative, the AVS transmission line would not be constructed. The existing environment within the project area would remain the same and no land would be used for development of transmission lines, facilities, or substations. The no-action alternative does not meet the identified purpose and need for the project. Under this alternative, it is expected that load growth would increase beyond the load-serving capacity of the existing transmission system for the Williston/Tioga region by 2016, resulting in transmission system reliability issues and violating the criteria established by NERC for transmission reliability in the region.

Alternative C

Alternative C includes approximately 278 miles of transmission line, including 265 miles of new 345-kV transmission line and 13 miles of new 230-kV line, four new substations, one new switchyard, and additional equipment but no expansion to four existing substations. Alternative C includes the following characteristics with each segment color-coded on Figure ES-2:

- 45 miles of 345-kV transmission line connecting the AVS Substation to a new Red Switchyard near Killdeer (light blue)
- 21 miles of 345-kV transmission line connecting the Red Switchyard to the existing Charlie Creek Substation (brown)
- 27 miles of 345-kV transmission line connecting the Red Switchyard to the new White Substation and 36 miles of 345-kV transmission line connecting the White Substation to the new Blue Substation (yellow)
- 51 miles of 345-kV transmission line from the Charlie Creek Substation to the Blue Substation (dark blue)
- 24 miles of 345-kV transmission line from the Blue Substation to the proposed Judson Substation (dark green)
- Two 230-kV single-circuit transmission lines running parallel for 5 miles connecting the Blue Substation to Western’s 230-kV transmission line (orange)
- 2 miles of 230/115-kV double-circuit transmission line connecting the proposed Judson Substation to the Williston Substation (light green)
- 61 miles of 345-kV transmission line connecting the proposed Judson Substation to the proposed Tande Substation, approximately 31 miles of which would be double-circuited with a MWEC 115-kV line associated with other regional improvement projects (pink)
- 1 mile of 230-kV transmission line connecting the proposed Tande Substation to the Neset Substation (purple)

Figure ES-2: Alternative C Overview Map

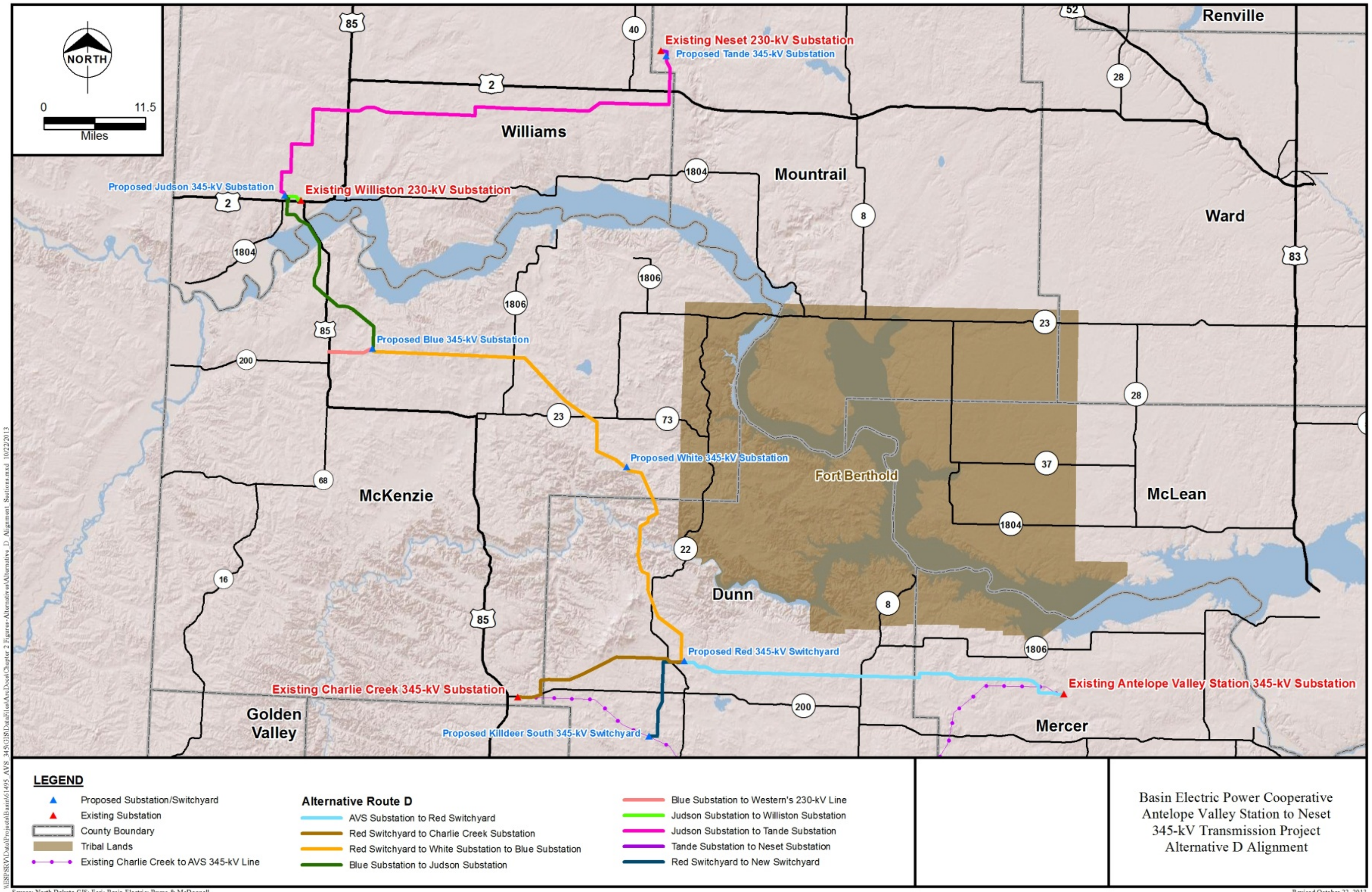


Alternative D

Alternative D is a modification of Alternative B in the DEIS (DEIS, Figure 2-4). The primary differences are that Alternative D includes constructing 345/345-kV double-circuit transmission lines north of Killdeer for 63 miles, the additional 345-kV Killdeer South Switchyard, a 345-kV transmission line connection between the Red Switchyard with the existing AVS to Charlie Creek 345-kV transmission line (via the Killdeer South Switchyard), and the addition of the Red Switchyard and White and Blue substations (also included as part of Alternative C). Alternative D would include constructing about 251 miles of transmission line beginning at the AVS Substation and ending at the Neset Substation, including 13 miles of new 230-kV line and 238 miles of new 345-kV transmission line, of which 63 miles would be 345/345-kV double-circuit. Alternative D would also include the construction of four new substations, two switchyards, and equipment additions but no expansion to the four existing substations. Alternative D includes the following characteristics with each segment color-coded on Figure ES-3:

- 45 miles of 345-kV transmission line connecting the AVS Substation to a new Red Switchyard near Killdeer (light blue)
- 21 miles of 345-kV transmission line connecting the Red Switchyard to the existing Charlie Creek Substation (brown)
- A new Killdeer South Switchyard south of Killdeer along Basin Electric's existing AVS to Charlie Creek 345-kV transmission line
- Two 345-kV single-circuit transmission lines running parallel for approximately 12 miles between the Red Switchyard and the new Killdeer South Switchyard (blue)
- 27 miles of 345/345-kV double-circuit transmission line connecting the Red Switchyard to the new White Substation and 36 miles of 345/345-kV double-circuit line connecting the White Substation to the new Blue Substation (yellow)
- 24 miles of 345-kV transmission line from the Blue Substation to the proposed Judson Substation (dark green)
- Two 230-kV single-circuit transmission lines running parallel for 5 miles connecting the Blue Substation to Western's 230-kV transmission line (orange)
- 2 miles of 230/115-kV double-circuit transmission line connecting the proposed Judson Substation to the Williston Substation (light green)
- 61 miles of 345-kV transmission line connecting the proposed Judson Substation to the proposed Tande Substation, approximately 31 miles of which would be double-circuited with a MWEC 115-kV line associated with other regional improvement projects (pink)
- 1 mile of 230-kV transmission line connecting the proposed Tande Substation to the Neset Substation (purple)

Figure ES-3: Alternative D Overview Map

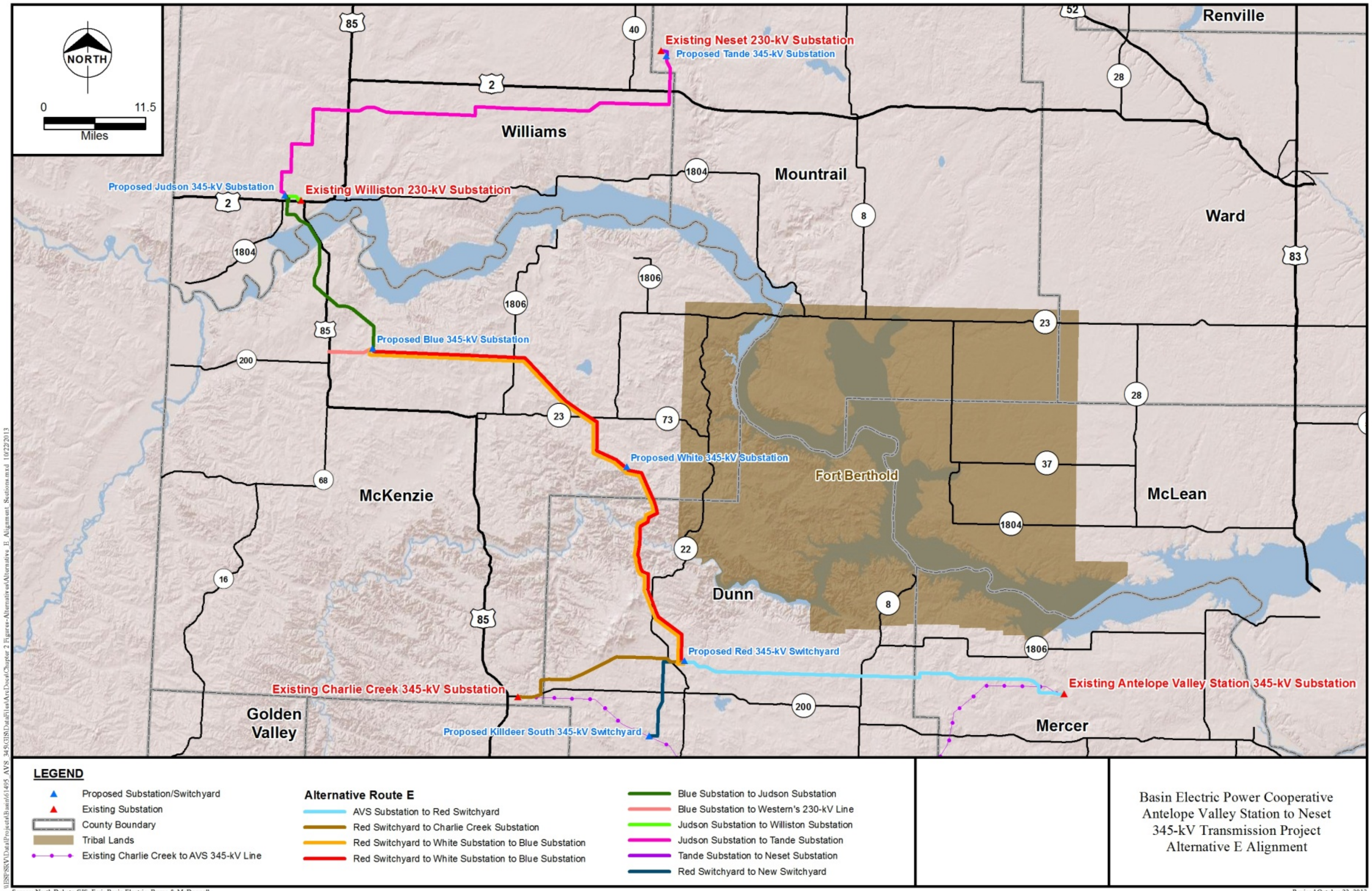


Alternative E

Alternative E would include constructing two parallel 345-kV lines between the Red Switchyard and the Blue Substation, along the eastern corridor. Alternative E, like Alternative D, is also a modification of Alternative B from the DEIS (DEIS, Figure 2-4). Alternative E would be the same as Alternative D with the primary difference being the construction of two parallel 345-kV transmission lines north of Killdeer for 63 miles rather than a double-circuit 345/345-kV line proposed as part of Alternative D. Alternative E would include construction of approximately 314 miles of transmission line beginning at the AVS Substation and ending at the Neset Substation, including 13 miles of new 230-kV line and 301 miles of new 345-kV line, of which 126 miles (63 miles times two) would be two single-circuit 345-kV parallel lines. It would also include construction of four new substations, two switchyards, and equipment additions but no expansion to four existing substations. Alternative E includes the following characteristics with each segment color-coded on Figure ES-4:

- 45 miles of 345-kV transmission line connecting the AVS Substation to a new Red Switchyard near Killdeer (light blue)
- 21 miles of 345-kV transmission line connecting the Red Switchyard to the existing Charlie Creek Substation (brown)
- A new Killdeer South Switchyard south of Killdeer along Basin Electric's existing AVS to Charlie Creek 345-kV transmission line
- Two 345-kV single-circuit transmission lines running parallel for approximately 12 miles between the Red Switchyard and the new Killdeer South Switchyard (blue)
- 27 miles of two parallel 345-kV single-circuit transmission lines connecting the Red Switchyard to the new White Substation and 36 miles of two parallel 345-kV single circuit lines connecting the White Substation to the new Blue Substation (yellow)
- 24 miles of 345-kV transmission line from the Blue Substation to the proposed Judson Substation (dark green)
- Two 230-kV single-circuit transmission lines running parallel for 5 miles connecting the Blue Substation to Western's 230-kV transmission line (orange)
- 2 miles of 230/115-kV double-circuit transmission line connecting the proposed Judson Substation to the Williston Substation (light green)
- 61 miles of 345-kV transmission line connecting the proposed Judson Substation to the proposed Tande Substation, approximately 31 miles of which would be double-circuited with a MWEC 115-kV line associated with other regional improvement projects (pink)
- 1 mile of 230-kV transmission line connecting the proposed Tande Substation to the Neset Substation (purple)

Figure ES-4: Alternative E Overview Map



POTENTIAL IMPACTS

Potential direct and indirect impacts were identified and evaluated for each aspect of the natural and built environments potentially affected by the project. The potential impacts of the project route alternatives and the no-action alternative are summarized in Table ES-2.

MITIGATION MEASURES FOR POTENTIAL IMPACTS

Numerous BMPs and mitigation measures have been incorporated into the development and construction of the proposed project to protect environmental and human resources. These measures are varied and may be intended to address specific resource concerns, be more general in nature, or address multiple areas of concern for different resources. Minimizing measures range from avoiding sensitive resources during project and route development to conditions for restoring the project right-of-way (ROW) following construction. BMPs identified to date that would be implemented as part of the project are discussed in Appendix A of this document. If additional mitigation measures are identified, they will be evaluated and considered.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible commitment of resources refers to the loss of future options for resource development or management, especially of nonrenewable resources such as cultural resources. Construction and operation of the proposed project would require up to 5,600 (Alternative E) acres for the ROW, which would restrict some types of development in the future. This would include federal, state and private lands. Most of these areas are in agricultural production or natural areas and in most cases these uses would continue after the transmission line and facilities are constructed and operating. The introduction of new transmission lines would permanently change the visual landscape in some areas. The construction of the project would require the irretrievable commitment of non-recyclable building materials and fuel consumed by construction equipment.

Table ES-2: Comparison of Alternatives

Resource	Alternative C		Alternative D		Alternative E		
Impact	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**No-action Alternative**
Land Use	Approximately 4,956.8 acres of right-of-way (ROW) would be required and would be restricted from some types of future development. ROW would include state and federal properties. ROW would include approximately 152.9 acres of Little Missouri National Grassland (LMNG), 57.9 acres of U.S. Army Corps of Engineer (USACE) property, approximately 202 acres of school trust land, and cross within approximately 200 feet of Bureau of Land Management (BLM) land. Approximately 73 acres would be permanently converted from agriculture use to utility use for the five new substations/switchyards.	Loss of use for landowners within ROW on private lands during construction. Access restrictions and/or loss of use within ROW during construction on state or federal properties. Disturbance from heavy equipment may result in some crop loss during construction Substation/switchyard construction-related impacts such as increased noise and dust on surrounding agricultural lands.	Approximately 4,458.6 acres of ROW would be required and would be restricted from some types of future development. ROW would include state and federal properties. ROW would include approximately 57.0 acres of LMNG, 57.9 acres of USACE property, approximately 143.9 acres of school trust land, and cross within approximately 200 feet of BLM land. Approximately 85 acres would be permanently converted from agriculture use to utility use for the six new substations/switchyards.	Same as Alternative C.	Approximately 5,597.3 acres of ROW would be required and would be restricted from some types of future development. ROW would include state and federal properties. ROW would include approximately 57.0 acres of LMNG, 57.9 acres of USACE property, approximately 209.9 acres of school trust land, and cross within approximately 200 feet of BLM land. Approximately 85 acres would be permanently converted from agriculture use to utility use for the six new substations/ switchyards.	Same as Alternatives C and D.	No direct effect; indirect effect if future land uses were impeded by lack of increased electrical supply necessary to meet demands of development.
Socioeconomic Resources	Economic benefit to businesses and surrounding communities from increased electrical capacity and reliability. Potential changes in property values with six residences within 500 feet of the route. Property tax revenues of about $83,130 annually to study area counties.	Economic benefit to local communities during construction as a result of construction crews generating local revenue.	Economic benefit to businesses and surrounding communities from increased electrical capacity and reliability. Potential changes in property values with five residences within 500 feet of the route. Property tax revenues of about $74,900 annually to study area counties.	Economic benefit to local communities during construction as a result of construction crews generating local revenue.	Economic benefit to businesses and surrounding communities from increased electrical capacity and reliability. Potential changes in property values with six residences within 500 feet of the route. Property tax revenues of about $93,660 annually to study area counties.	Economic benefit to local communities during construction as a result of construction crews generating local revenue.	No direct effect; indirect effect if no improved electric reliability and capacity. This would harm local communities by limiting future development opportunities.
Environmental Justice	Land use restrictions within the ROW. Possible impact to property values for seven residences located in environmental justice blocks of 52 total residences within 0.25 mile. Visual presence and increase in fiscal receipts to counties.	Increase in noise and potential traffic disruptions during construction.	Land use restrictions within the ROW. Possible impact to property values for six residences located in environmental justice blocks of 44 total residences within 0.25 mile. Visual presence and increase in fiscal receipts to counties.	Increase in noise and potential traffic disruptions during construction.	Land use restrictions within the ROW. Possible impact to property values for six residences located in environmental justice blocks of 45 total residences within 0.25 mile. Visual presence and increase in fiscal receipts to counties.	Increase in noise and potential traffic disruptions during construction.	No effect.

Resource	Alternative C		Alternative D		Alternative E		
Impact	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**No-action Alternative**
Recreation and Tourism	Approximately 413.3 acres of state or federal land potentially open to dispersed recreational activities such as hunting would be located within the ROW. One U.S. Forest Service campground (Summit Campground) would be located within 0.5 mile of the ROW. Conversion of 73 acres of land for the five substations/switchyards would remove it from further land use, including recreational use.	Increased noise, dust, and traffic congestion in recreational areas. Temporary access restrictions during construction on public use areas. Increased noise, ground disturbance, access restrictions, and human activity may impede hunting activities around the substation/ switchyard sites.	Approximately 258.8 acres of state or federal land potentially open to dispersed recreational activities such as hunting would be located within the ROW. Conversion of 85 acres of land for the six substations/switchyards would remove it from further land use, including recreational use.	Same as Alternative C.	Approximately 324.8 acres of state or federal land potentially open to dispersed recreational activities such as hunting would be located within the ROW. Conversion of 85 acres of land for the six substations/switchyards would remove it from further land use, including recreational use.	Same as Alternatives C and D.	No effect.
Utility Infrastructure and Transportation	No long-term effects on utility infrastructure are anticipated. No long-term effects on transportation are anticipated. An air space obstruction would result in the vicinity of the Sloulin Field International Airport in the city of Williston. Approvals would be necessary from the Federal Aviation Administration (FAA). No obstruction would result if the airport is relocated as proposed. Basin Electric would coordinate with BNSF Railway Company (BNSF) to minimize or avoid potential impacts on railroads in areas where the alternative route would traverse railroads at a vertical elevation.	Existing utility infrastructure would be traversed during construction activities and may be temporary taken out of service. Some temporary road closures are likely during construction activities and may result in short-term adverse impacts. Basin Electric would also coordinate with BNSF in order to string the transmission line over existing railroad tracks. Short-term interruption of existing transmission lines during substation/switchyard construction activities may result minor temporary impacts. The movement of heavy material haul trucks and road closures during substation/switchyard construction activities may result in short-term adverse impacts.	No long-term effects on utility infrastructure are anticipated. No long-term effects on transportation are anticipated. An air space obstruction would result in the vicinity of the Sloulin Field International Airport in the city of Williston. Approvals would be necessary from the FAA. No obstruction would result if the airport is relocated as proposed. Basin Electric would coordinate with BNSF to minimize or avoid potential impacts on railroads in areas where the alternative route would traverse railroads at a vertical elevation.	Existing utility infrastructure would be traversed during construction activities and may be temporary taken out of service. Some temporary road closures are likely during construction activities and may result in short-term adverse impacts. Basin Electric would also coordinate with BNSF in order to string the transmission line over existing railroad tracks. Short-term interruption of existing transmission lines during substation/switchyard construction activities may result minor temporary impacts. The movement of heavy material haul trucks and road closures during substation/switchyard construction activities may result in short-term adverse impacts.	No long-term effects on utility infrastructure are anticipated. No long-term effects on transportation are anticipated. Air space obstruction would result in the vicinity of the Sloulin Field International Airport in the city of Williston. Approvals would be necessary from the FAA. No obstruction would result if the airport is relocated as proposed. Basin Electric would coordinate with BNSF to minimize or avoid potential impacts on railroads in areas where the alternative route would traverse railroads at a vertical elevation.	Existing utility infrastructure would be traversed during construction activities and may be temporary taken out of service. Some temporary road closures are likely during construction activities and may result in short-term adverse impacts. Basin Electric would also coordinate with BNSF in order to string the transmission line over existing railroad tracks. Short-term interruption of existing transmission lines during substation/switchyard construction activities may result minor temporary impacts. The movement of heavy material haul trucks and road closures during substation/switchyard construction activities may result in short-term adverse impacts.	Significant utility system failures and damage if capacity is not increased and demand increases as projected. Electrical equipment used for oil and gas pipelines could be limited by reliability thereby causing more distribution via truck, causing road damage.
Geology and Landforms	Displacement of 2.4 million cubic feet of soil and rock during construction.	Potential for erosion on steeper slopes during construction.	Displacement of 2.2 million cubic feet of soil and rock during construction.	Potential for erosion on steeper slopes during construction.	Displacement of 2.7 million cubic feet of soil and rock during construction.	Potential for erosion on steeper slopes during construction.	No effect.

Resource	Alternative C		Alternative D		Alternative E		
Impact	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	No-action Alternative
Soils and Farmland	Approximately 1.4 acres of soil surface (0.0009-acre per structure) would be permanently removed from production. Farmland for crop production permanently impacted only at structure locations. Any farmland within the five substation/switchyard sites (73 acres total) would be permanently converted to utility use.	Approximately 1,754 acres of temporary soil disturbance to prime farmland and farmland of statewide importance during construction within the ROW, with temporary loss of crop production.	Approximately 1.3 acres of soil surface (0.0009-acre per structure) would be permanently removed from production. Farmland for crop production permanently impacted only at structure locations. Any farmland within the six substation/switchyard sites (85 acres total) would be permanently converted to utility use.	Approximately 1,737 acres of temporary soil disturbance to prime farmland and farmland of statewide importance during construction within the ROW, with temporary loss of crop production.	Approximately 1.6 acres of soil surface (0.0009-acre per structure) would be permanently removed from production. Farmland for crop production permanently impacted only at structure locations. Any farmland within the six substation/switchyard sites (85 acres total) would be permanently converted to utility use.	Approximately 1,900 acres of temporary soil disturbance to prime farmland and farmland of statewide importance during construction within the ROW, with temporary loss of crop production.	No effect.
Water Resources	No effects anticipated. Approximately 14.3 acres of open water occur within the ROW; 19 perennial waterways and 16.5 acres of Federal Emergency Management Agency (FEMA) floodplain would be crossed, but all would be spanned.	Potential sedimentation and runoff caused by construction.	No effects anticipated. Approximately 12.7 acres of open water occur within the ROW; 17 perennial waterways and 16.5 acres of FEMA floodplain would be crossed, but all would be spanned.	Potential sedimentation and runoff caused by construction.	No effects anticipated. Approximately 14.5 acres of open water occur within the ROW; 20 perennial waterways and 16.5 acres of FEMA floodplain would be crossed, but all would be spanned.	Potential sedimentation and runoff caused by construction.	No effect.
Vegetation	Approximately 183 acres of woodland potentially removed within ROW, depending on slope. One acre of vegetation permanently removed within ROW at structure locations. Potential introduction of noxious weeds within ROW to be avoided by weed mitigation measures. Approximately 73 acres of vegetation removed from the five substation/switchyard sites and converted to utility use.	Disturbance of vegetation within the ROW and along construction access trails during construction. Natural Heritage Inventory sensitive ecological community potentially impacted.	Approximately 120 acres of woodland potentially removed within ROW, depending on slope. One acre of vegetation permanently removed within ROW at structure locations. Potential introduction of noxious weeds within ROW to be avoided by weed mitigation measures. Approximately 85 acres of vegetation removed from the six substation/switchyard sites and converted to utility use.	Disturbance of vegetation within the ROW and along construction access trails during construction. Natural Heritage Inventory sensitive ecological community potentially impacted.	Approximately 189 acres of woodland potentially removed within ROW, depending on slope. One acre of vegetation permanently removed within ROW at structure locations. Potential introduction of noxious weeds within ROW to be avoided by weed mitigation measures. Approximately 85 acres of vegetation removed from the six substation/switchyard sites and converted to utility use.	Disturbance of vegetation within the ROW and along construction access trails during construction. Natural Heritage Inventory sensitive ecological community potentially impacted.	No effect.
Wildlife	Loss of forested habitat as a result of the removal of up to 183 acres of woodland within the ROW. Some mortality of small, less-mobile species. Potential avian species collisions with power lines. Loss of 73 acres of habitat within the five substation/switchyard sites.	Disturbance within and near the ROW during construction due to human intrusion, noise, and construction activity. Temporary loss of habitat due to vegetation clearing within ROW during construction. Disturbance to nearby species due to construction activities at the five substation/switchyard sites.	Loss of forested habitat as a result of the removal of up to 120 acres of woodland within the ROW. Some mortality of small, less-mobile species. Potential avian species collisions with power lines. Loss of 85 acres of habitat within the six substation/switchyard sites.	Disturbance within and near the ROW during construction due to human intrusion, noise, and construction activity. Temporary loss of habitat due to vegetation clearing within ROW during construction. Disturbance to nearby species due to construction activities at the six substation/switchyard sites.	Loss of forested habitat as a result of the removal of up to 189 acres of woodland within the ROW. Some mortality of small, less-mobile species. Potential avian species collisions with power lines. Loss of 85 acres of habitat within the six substation/ switchyard sites.	Disturbance within and near the ROW during construction due to human intrusion, noise, and construction activity. Temporary loss of habitat due to vegetation clearing within ROW during construction. Disturbance to nearby species due to construction activities at the six substation/switchyard sites.	No effect.
Aquatic Resources	Change in local aquatic habitats in areas where vegetation would be cleared along shoreline.	Potential for sedimentation, runoff, and spills during construction; to be avoided by use of BMPs.	Change in local aquatic habitats in areas where vegetation would be cleared along shoreline.	Potential for sedimentation, runoff, and spills during construction; to be avoided by use of BMPs.	Change in local aquatic habitats in areas where vegetation would be cleared along shoreline.	Potential for sedimentation, runoff, and spills during construction; to be avoided by use of BMPs.	No effect.

Resource	Alternative C		Alternative D		Alternative E		
Impact	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**No-action Alternative**
Special Status Species	No adverse effect on listed species pending outcome of consultation with USFWS and USFS.	Potential impacts on grassland habitat within ROW during construction	No adverse effect on listed species pending outcome of consultation with USFWS and USFS.	Potential impacts on grassland habitat within ROW during construction	No adverse effect on listed species pending outcome of consultation with USFWS and USFS.	Potential impacts on grassland habitat within ROW during construction	No effect.
Wetlands	No effect. All 33 acres of wetland within ROW would be spanned. No structures would be placed in wetlands and no wetland vegetation would be cleared.	Potential sedimentation and runoff caused by construction near wetlands.	No effect. All 31 acres of wetland within ROW would be spanned. No structures would be placed in wetlands and no wetland vegetation would be cleared.	Potential sedimentation and runoff caused by construction near wetlands.	No effect. All 40 acres of wetland within ROW would be spanned. No structures would be placed in wetlands and no wetland vegetation would be cleared.	Potential sedimentation and runoff caused by construction near wetlands.	No effect.
Aesthetics and Visual Resources	Change in the visual characteristics and viewshed within project area and for residents located near the transmission line (six residences within 500 feet). Additional visual element added to the landscape at the five substation/switchyard sites.	Visibility of construction vehicles and equipment along ROW.	Change in the visual characteristics and viewshed within project area and for residents located near the transmission line (five residences within 500 feet). Additional visual element added to the landscape at the six substation/switchyard sites.	Visibility of construction vehicles and equipment along ROW.	Change in the visual characteristics and viewshed within project area and for residents located near the transmission line (six residences within 500 feet). Additional visual element added to the landscape at the six substation/switchyard sites.	Visibility of construction vehicles and equipment along ROW.	No effect.
Cultural Resources	Currently evaluating whether project would have adverse effects on National Register of Historic Places (NRHP)-eligible cultural resources. 286 cultural resources have been identified within or immediately adjacent to the 1,000-foot preliminary area of potential effects (APE).	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources.	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources. 88 cultural resources have been identified within or immediately adjacent to the 1,000-foot preliminary APE.	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources.	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources. 88 cultural resources have been identified within or immediately adjacent to the 1,000-foot preliminary APE.	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources.	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources.
Noise	No effect.	Increases in noise levels along the ROW from construction vehicles and equipment. Increases in noise levels for nearby residences during construction of the five substations/ switchyards.	No effect.	Increases in noise levels along the ROW from construction vehicles and equipment. Increases in noise levels for nearby residences during construction of the six substations/ switchyards.	No effect.	Increases in noise levels along the ROW from construction vehicles and equipment. Increases in noise levels for nearby residences during construction of the six substations/switchyards.	No effect.
Air Quality and Greenhouse Gas (GHG) Emissions	Potential increase in GHG levels as a result of the operation of the transmission line and substations/switchyards.	Increases in fugitive dust caused by construction activity, vehicles, and equipment. Increased emissions from construction vehicles and equipment.	Potential increase in GHG levels as a result of the operation of the transmission line and substations/switchyards.	Increases in fugitive dust caused by construction activity, vehicles, and equipment. Increased emissions from construction vehicles and equipment.	Potential increase in GHG levels as a result of the operation of the transmission line and substations/switchyards.	Increases in fugitive dust caused by construction activity, vehicles, and equipment. Increased emissions from construction vehicles and equipment.	No effect.

Resource	Alternative C		Alternative D		Alternative E		
Impact	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**No-action Alternative**
Public Health and Safety	Long-term adverse effects expected to be negligible to minor. Electric and magnetic fields (EMFs) would be well below identified thresholds to protect the public. The operation of farm equipment near proposed structures could result in unnecessary contact and/or damage to machinery and/or operators. Standard operating and safety procedures would be employed to ensure the safe delivery of services.	Hazardous and/or potentially hazardous materials may be encountered during construction, or exposure to energized transmission lines. These impacts are likely to be minor with the implementation of construction action plans that ensure worker safety, proper handling of hazardous materials, and spill cleanup.	Long-term adverse effects expected to be negligible to minor. EMFs would be well below identified thresholds to protect the public. The operation of farm equipment near proposed structures could result in unnecessary contact and/or damage to machinery and/or operators. Standard operating and safety procedures would be employed to ensure the safe delivery of services.	Hazardous and/or potentially hazardous materials may be encountered during construction, or exposure to energized transmission lines. These impacts are likely to be minor with the implementation of construction action plans that ensure worker safety, proper handling of hazardous materials, and spill cleanup.	Long-term adverse effects expected to be negligible to minor. EMFs would be well below identified thresholds to protect the public. The operation of farm equipment near proposed structures could result in unnecessary contact and/or damage to machinery and/or operators. Standard operating and safety procedures would be employed to ensure the safe delivery of services.	Hazardous and/or potentially hazardous materials may be encountered during construction, or exposure to energized transmission lines. These impacts are likely to be minor with the implementation of construction action plans that ensure worker safety, proper handling of hazardous materials, and spill cleanup.	No effect.

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Antelope Valley Station to Neset Transmission Project

Supplemental Draft Environmental Impact Statement

December 2013

Prepared for:

U.S. Department of Agriculture, Rural Utilities Service

Cooperating Agencies:

Western Area Power Administration

U.S. Forest Service

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Disclaimer

The Antelope Valley Station to Neset Transmission Project Supplemental Draft Environmental Impact Statement (Supplemental DEIS) was prepared to evaluate additional alternatives for the project that were not evaluated in the Draft EIS published in November 2012. Much of the discussion relevant to the affected environment for all resources has not changed from the DEIS. Therefore, these sections have not been reprinted in the Supplemental DEIS. Throughout this document, references are made to the sections in the DEIS where readers can find the relevant information on the affected environment and other sections as necessary.

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1.0 INTRODUCTION

In November 2012, the Rural Utilities Service (RUS) issued a Draft Environmental Impact Statement (DEIS) evaluating the environmental implications of the Antelope Valley Station (AVS) to Neset Transmission Project. The originally-proposed project, as evaluated in the DEIS, considered the development of a single 345-kilovolt (kV) transmission line and two new substations in conjunction with one of two alternative routes. The proposed project was designed to increase transmission line capacity to meet the expected increase in load. However, new load forecasts show the load increasing above and beyond the original forecast by nearly 50 percent (Kardmas, Lee & Jackson, Inc. [KLJ], 2012). Therefore the original project as described in the DEIS would not achieve capacity needs or reliability standards.

RUS made the decision to prepare a Supplemental Draft Environmental Impact Statement (Supplemental DEIS) for the AVS to Neset Transmission Project to evaluate significant project changes that have occurred since the DEIS was published and the comment period closed. To efficiently and reliably meet the increased demand projections, additional alternatives, including building a transmission line on both routes A and B, parallel and double-circuit lines on the route B alternative, and additional substation components are evaluated in this Supplemental DEIS.

This Supplemental DEIS was prepared to meet the following key objectives.

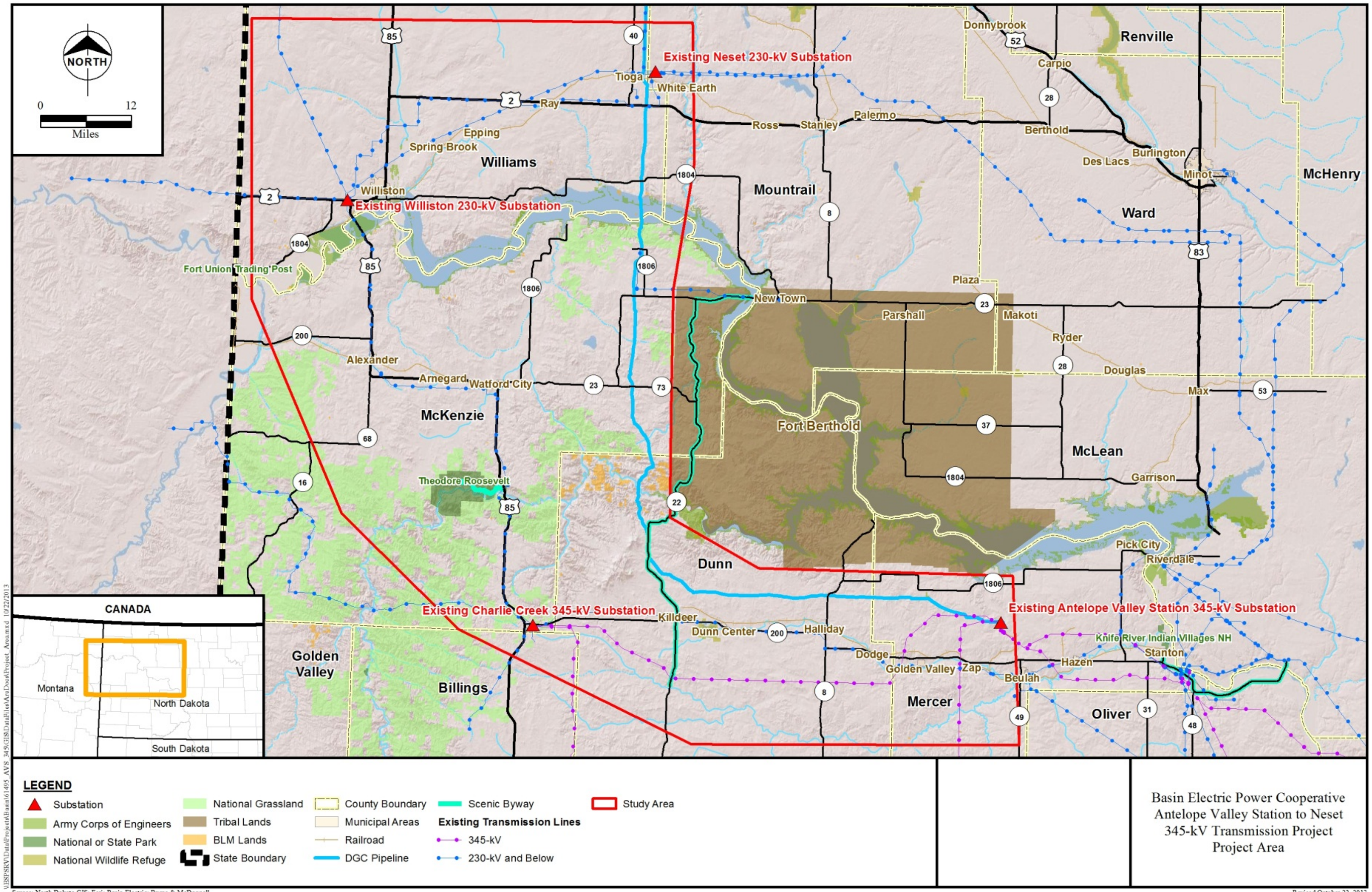
- Identify and assess potential impacts on the natural and human environment that would result from the construction and operation of the AVS to Neset Transmission Line Project.
- Describe and evaluate additional alternatives that would meet the purpose and need of the project while avoiding or minimizing adverse effects on the environment, and compare them to a no-action alternative.
- Identify specific mitigation measures to minimize environmental impacts.

This chapter provides a project overview and description of the AVS to Neset Transmission Line Project (Section 1.1), purpose and need for the project (Section 1.2), and the regulatory framework and authorizing actions that are pertinent to the project (Section 1.3).

1.1 PROJECT OVERVIEW AND DESCRIPTION

Basin Electric Power Cooperative (Basin Electric) proposes to construct, operate, and maintain a new electrical transmission line connecting the existing AVS, Charlie Creek, Williston, and Neset substations with five newly proposed delivery substations/switchyards. The overall project area identified for this project encompasses parts of Mercer, Dunn, McKenzie, Williams, and Mountrail counties in North Dakota, and is shown in Figure 1-1.

Figure 1-1: Project Area



The project would include approximately 278 miles of transmission line, including 265 miles of new 345-kV transmission line and 13 miles of new 230-kV line, four new substations, a new switchyard, and equipment additions, but no expansion within four existing substations. The new 345-kV transmission line would start at the AVS electric generation facility located near Beulah and extend west where it would connect with Basin Electric's existing Charlie Creek 345-kV Substation near Grassy Butte. The line would then extend north where it would connect with Basin Electric's proposed new Judson 345-kV Substation near Williston and terminate at Basin Electric's proposed new Tande 345-kV Substation. Additional 230-kV transmission lines would be constructed between the new Judson Substation and the existing U.S. Department of Energy, Western Area Power Administration's (Western) Williston 230-kV Substation, between a new 345/230/115-kV Substation (referred to as the Blue Substation) and Western's existing 230-kV transmission line, and also between the new Tande Substation and Basin Electric's existing Neset 230-kV Substation near Tioga, North Dakota.

The proposed segments and lengths of the overall project are as follows. This project would include a 61-mile, 345-kV line from the AVS Substation to the existing Charlie Creek Substation. A new 345-kV switchyard, referred to as the Red Switchyard, would be constructed along this segment of line in the Killdeer area to connect a 63-mile 345-kV line to a new 345/115-kV substation, referred to as the White Substation and the Blue Substation. The Charlie Creek Substation would also be connected by a 51-mile segment to the new Blue Substation. The Blue Substation would be located south of the Missouri River to interconnect the 345-kV line with Western's 230-kV line. Approximately 5 miles of single-circuit parallel 230-kV lines would connect the Blue Substation with the existing 230-kV Western line. A 345/115-kV substation would also be located at the Blue Substation location to connect to the local 115-kV system. The interconnections described above would provide a delivery loop within the Williston Load Pocket area. This delivery loop provides connections to the local 115-kV system and a reliable power delivery to the McKenzie County load delivery area.

The White Substation would be constructed along the Red Switchyard to Blue Substation transmission line segment to interconnect with the local 115-kV system for load-serving purposes. A single 345-kV line would extend approximately 24 miles north from the Blue Substation to the proposed Judson Substation near Williston. The proposed Judson Substation would then interconnect with the proposed Tande Substation by a 61-mile line segment (including approximately 31 miles of double circuit with a Mountrail-Williams Electric Cooperative [MWEC] 115-kV line) and a 2-mile, 230-kV transmission line would interconnect the proposed Judson Substation to Western's existing Williston Substation. Finally, the proposed Tande Substation would connect with the existing Neset Substation by a 1-mile, 230-kV line segment.

The Supplemental DEIS considers two additional alternatives, similar to the alignment of Alternative B discussed in the DEIS. The primary difference would be either a double-circuit

345-kV line or two parallel lines running 63 miles from the Red Switchyard near Killdeer to the new White Substation and on to the Blue Substation and the additional Killdeer South Switchyard. The Killdeer South Switchyard would interconnect the Red Switchyard to the existing AVS to Charlie Creek 345-kV transmission line by 12 miles of parallel 345-kV single-circuit transmission line.

Basin Electric has requested financial assistance from the RUS to construct the AVS to Neset Transmission Project. RUS has determined that the agency's decision to finance the project would constitute a major federal action that may have a significant impact on the environment within the context of the National Environmental Policy Act of 1969 (NEPA). RUS is serving as the lead federal agency for the NEPA environmental review of the project. Western and the U.S. Department of Agriculture (USDA), Forest Service (USFS) are serving as cooperating agencies for the project. RUS has prepared this Supplemental DEIS in compliance with the requirements of NEPA and the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508). Western is serving as the lead federal agency for compliance with Section 106 of the National Historic Preservation Act (NHPA) for cultural resources and consultation under Section 7 of the Endangered Species Act (ESA) for threatened and endangered species.

In addition to compliance with all applicable federal regulations, permits and approvals must be granted by the state of North Dakota. The North Dakota Energy Conversion and Transmission Facility Siting Act states that it is necessary to ensure that the location, construction, and operation of energy conversion and transmission facilities will produce minimal adverse effects on the environment and on the welfare of the citizens of the state by providing that no energy conversion or transmission facility shall be located, constructed, and operated within North Dakota without a certificate of site compatibility and a route permit acquired pursuant to Chapter 49-22 of the North Dakota Century Code (North Dakota Century Code, 2011a). It is state policy to site energy conversion facilities and to route transmission facilities in an orderly manner compatible with environmental preservation and the efficient use of resources. To comply with the North Dakota Energy Conversion and Transmission Facility Siting Act, sites and routes shall be chosen to minimize adverse human and environmental impacts while ensuring continuing system reliability and integrity and ensuring that energy needs are met and fulfilled in an orderly and timely fashion. The Certificate of Corridor Compatibility establishes a corridor through which the proposed facilities may be routed. The Route Permit is acquired through a pre-application route development phase, a review of completeness, a public meeting process, and finally a route approval that is contingent on adherence to other federal, state, or local permitting considerations (North Dakota Public Service Commission [NDPSC], 2012a).

RUS and Western notified and invited the State Historical Office, Native American tribes, federal and state permitting agencies, and other identified agencies and organizations to participate in Section 106 consultation. The following Native American tribes have been invited to participate in the consultation.

- Flandreau Santee Sioux
- Fort Belknap Indian Community
- Fort Peck Assiniboine and Sioux Tribes
- Leech Lake Band of Ojibwe
- Lower Sioux Indian Community
- Minnesota Chippewa Tribe
- Prairie Island Indian Community
- Santee Sioux Nation
- Spirit Lake Tribe
- Standing Rock Sioux
- Sisseton Wahpeton Oyate
- Three Affiliated Tribes
- Turtle Mountain Chippewa
- Upper Sioux Indian Community
- White Earth Nation

1.2 PURPOSE AND NEED FOR ACTION

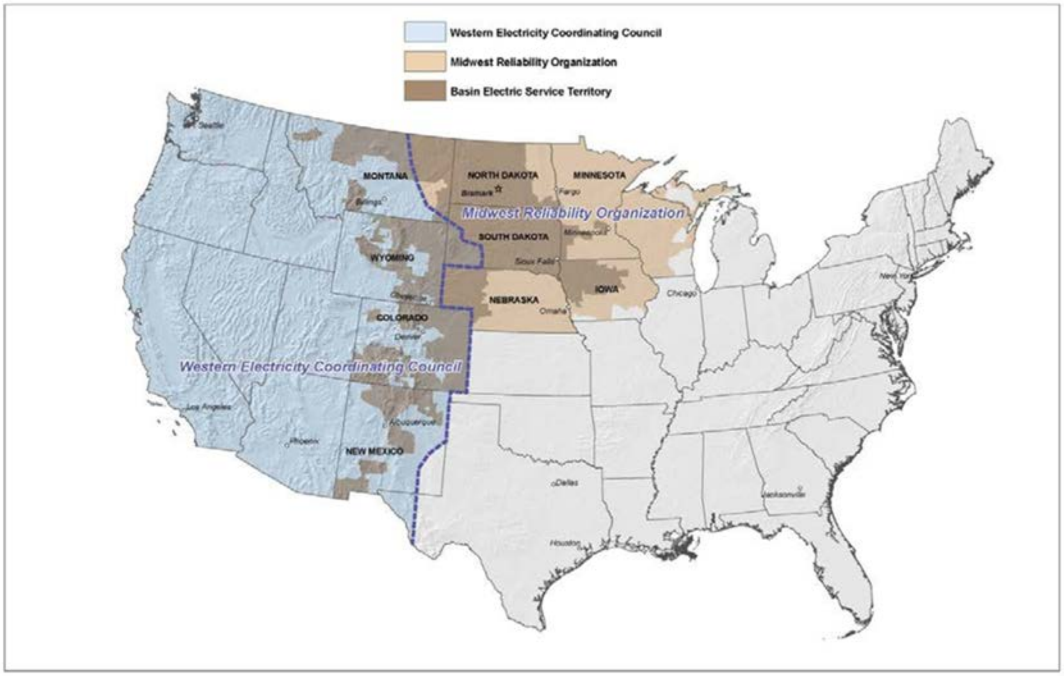
Several agencies will use this analysis to make decisions related to funding, authorizing, or permitting various components of the proposed transmission line. RUS, the lead agency, will determine whether or not to provide financial assistance for the project. Cooperating agencies on the Supplemental DEIS include Western and USFS. Western will evaluate the request by Basin Electric to interconnect the proposed project with the Williston Substation and connect to Western's Williston to Charlie Creek 230-kV transmission line south of Williston. USFS has primary responsibility to issue special use authorizations for construction, operation, and maintenance of a transmission line on National Forest System lands. USFS will use this analysis to make a decision related to the approval of the Special Use Permit (SUP) submitted by Basin Electric to construct, maintain, and operate a transmission line through lands administered by USFS on the Little Missouri National Grasslands (LMNG). The USFS Supervisor of the Dakota Prairie Grasslands will issue a decision on whether or not to authorize the SUP to Basin Electric.

The following section describes the purpose and need for the AVS to Neset Transmission Project. The purpose and need addresses the different perspectives of the entities involved with developing the project. This includes Basin Electric, RUS, Western, and USFS.

1.2.1 Basin Electric Purpose and Need

Basin Electric is a regional wholesale electric generation and transmission cooperative owned and controlled by the 134 member cooperatives it serves. It was created in May 1961 as a result of regional efforts by electric distribution cooperatives. Basin Electric serves approximately 2.8 million customers in 540,000 square miles, covering portions of nine states, including Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming (see Figure 1-2).

Figure 1-2: Basin Electric Service Territory



Source: Western, 2010a

Within the Basin Electric service area, northwestern North Dakota is experiencing a rapid increase in development as a result of the activities associated with oil extraction from the Bakken shale formation, currently concentrated in McKenzie, Mountrail and Williams counties. The level of development that has occurred and is planned for the future will require numerous infrastructure upgrades throughout the region, including an increase in electrical transmission capacity and reliability. Studies of power supply for the region and the upper Midwest (Integrated System [IS], 2011) indicate that a new 345-kV transmission line and associated substation additions and upgrades are needed to increase the capacity to distribute electricity to serve the long-term needs of northwestern North Dakota. In addition, the project is expected to help maintain the reliability of the delivery system. The purpose of this analysis is to identify an acceptable route that minimizes the impacts on the environment and regional socioeconomic resources of the AVS to Neset Transmission Project.

Initially Basin Electric and IS load forecasts determined that one 345-kV transmission line would be sufficient to meet future growth and this was the basis for the DEIS. However, current development forecasts resulted in updated revised load growth forecasts in 2012 (KLJ, 2012). Basin Electric concluded that to meet the current load forecasts, the AVS to Neset Transmission Project would need to include an additional 345-kV line in the McKenzie County area and provide additional load-serving substations to connect with the transmission system in the area. In the region, demand for Basin Electric power from the oil industry alone is projected to increase from 9 to 22 percent of Basin Electric's overall power production by 2025. The demand from large commercial operations follows a similar increase as it supports the oil and gas industry. This project would address system capacity issues resulting from rapid growth in the area. In assessing project need, Basin Electric determined that the single 345-kV line from AVS to Killdeer and from south of Williston to Tioga would not be sufficient to meet the projected need. Based on the new load forecast, two 345-kV lines are required in the McKenzie County area of the project, including one from Charlie Creek to proposed Judson Substation south of Williston (previously proposed) and one from the Killdeer area to the proposed Judson Substation south of Williston (new).

System Reliability Issues

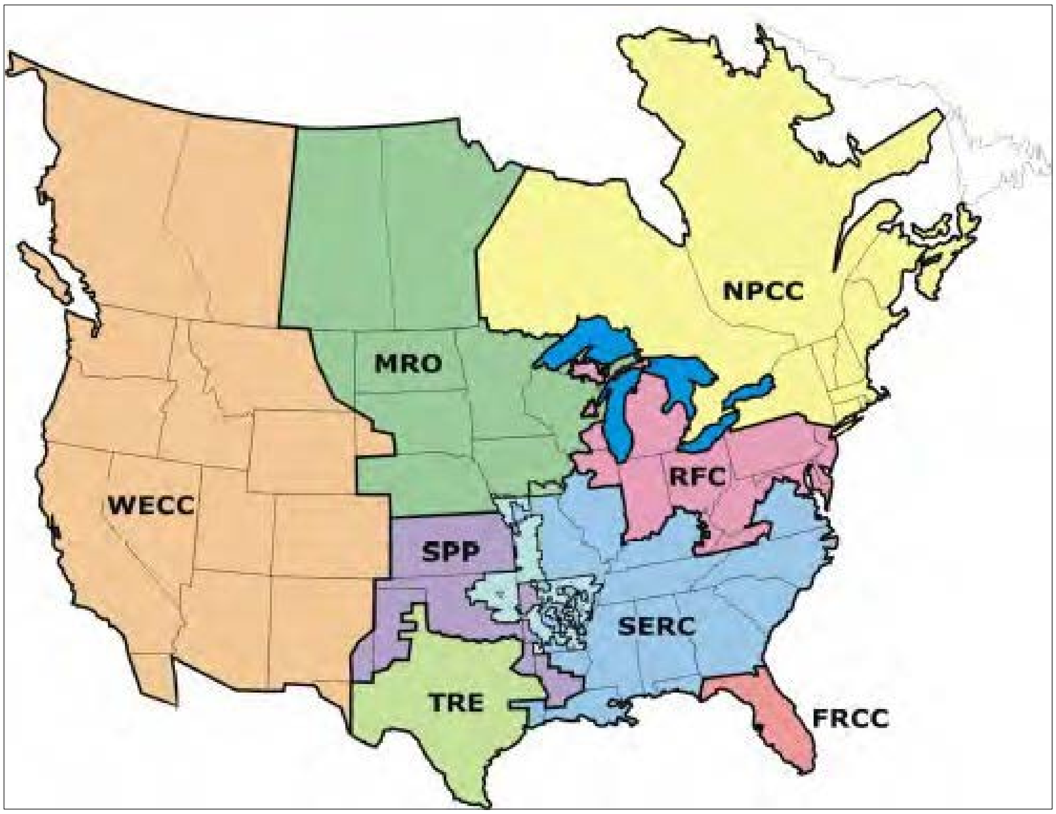
The Federal Energy Regulatory Commission (FERC) has the authority to develop and enforce reliability standards. These standards are in place to ensure system reliability, which is defined by the U.S. Department of Energy's Energy Information Administration as "a measure of the ability of the system to continue operation while some lines or generators are out of service. Reliability deals with the performance of the system under stress" (Energy Information Administration, 2012). The system load-serving capacity is the amount of load that can be accommodated without violating reliability criteria. The term "system" as it is used here refers to both generation and transmission components. It does not, however, include the low-voltage distribution lines that deliver electricity to consumers.

Section 215 of the Energy Policy Act of 2005 (Public Law 109-58) requires the creation of an Electric Reliability Organization with authority to establish, approve, and enforce mandatory electricity reliability standards, subject to review and approval by FERC. In 2006, FERC established rules for certification of the Electric Reliability Organization and procedures for establishment, approval, and enforcement of reliability standards.

In 2006, the North American Electric Reliability Corporation (NERC), a pre-existing voluntary reliability organization, was certified as the Electric Reliability Organization in the United States. The authority and certification granted to NERC also included a provision for the newly-certified Electric Reliability Organization to delegate certain authority to regional entities as shown in Figure 1-3 for the purpose of proposing and enforcing reliability standards in particular regions of the country (FERC, 2006).

NERC reliability standards apply to all owners, users, and operators of the bulk power system, which includes the electric generation and transmission system in North America. The reliability standards are developed by NERC and approved by FERC. Among the many reliability standards NERC has developed are sets of standards for transmission operations and transmission planning.

Figure 1-3: NERC Reliability Regions



Source: FERC, 2006

The Midwest Reliability Organization

The Midwest Reliability Organization's (MRO) current primary function is to monitor and enforce the NERC Reliability Standards. The MRO has delegated much of its transmission reliability responsibility to two Reliability Coordinators. NERC guidelines require that each regional reliability organization establish one or more Reliability Coordinators to "continuously assess transmission reliability and coordinate emergency operations among the operating entities within the region and across the regional boundaries" (MRO, 2010).

For the Basin Electric service area in northwestern North Dakota, the Reliability Coordinator is known as the Integrated System (IS) that consists of Western, Basin Electric, and Heartland Consumers Power District. The IS provides the high-voltage transmission system grid in eastern Montana, North Dakota, and South Dakota.

The IS transmission facilities consist of approximately 9,200 miles of interconnected high-voltage transmission lines, of which approximately 1,340 miles are owned by Basin Electric. The IS transmission system provides for delivery of power from federal hydroelectric facilities and thermal generation plants owned by Basin Electric and Heartland Consumers Power District. The IS provides open-access transmission service to customers in the region.

Project Area Reliability Issues

The existing high voltage system in the Williston/Tioga region consists of 230-kV and 115-kV systems that connect to Saskatchewan, Canada; eastern Montana; central North Dakota; and western North Dakota. Should the load level exceed transmission system capacity, outage of any of these paths could cause low voltage criteria violations and overload adjacent transmission lines in the Williston/Tioga region and therefore be in violation of NERC reliability standards. The IS study focused on the area with the most rapidly changing and increasing demand and the greatest potential for outage issues in the eastern Montana and western North Dakota area, identified as the Williston Load Pocket. In conducting the analysis and to maintain consistency, various demand and outage scenarios were used that other MRO service providers and reviewing authorities had previously approved. The scenarios included isolating local projects that are in the process of being constructed or planned for construction that would provide minor improvements to reliability over the short term. The results of the IS analysis identified short- and long-term serious overload and low voltage NERC criteria violations (IS, 2011) in scenarios with the high load growth modeled.

Load Forecast

The power load forecast indicates growth in the northwestern North Dakota area is accelerating primarily as a result of development of the Bakken Formation. Much of the short-term load growth in this area is associated with provision of electrical service to support the rapid expansion of facilities for oil and natural gas production, as well as supporting infrastructure and services. As a follow-up to the previous Basin Electric load forecasts, a third-party study undertaken in 2012 (KLJ, 2012) confirms the load projections in northwestern North Dakota due to rapidly expanding electrical service in this region.

While there are 17 oil-producing counties in North Dakota, all of which are located in the western third of the state, the top producing counties in 2012 included Mountrail, McKenzie, Dunn, and Williams in northwestern North Dakota. Oil production in North Dakota increased from 62.8 million barrels of oil in 2008 to 242 million barrels in 2012 (a 285 percent increase). Production is expected to continue to increase with the development of an estimated 1,100 to 2,700 new wells per year in western North Dakota and 40,000 to 45,000 new wells over the next 20 plus years (Bangsund and Hodur, 2013). Electric transmission lines have recently been constructed or are in development in western North Dakota to support expanding development and supporting infrastructure.

Table 1-1 shows the load forecasts for northwestern North Dakota in the Williston/Tioga region that were developed during 2011 (column 2) compared with the forecast that was released in 2013 (column 3). The load forecast completed in 2013 shows a significant increase over the forecast published in 2011, ranging from a 25 percent increase in the 2013-2014 winter season to nearly 50 percent by 2016-2017. In addition, it is likely that similar trends are occurring in the regions adjacent to the Williston/Tioga area.

Table 1-1: Basin Electric Member Load Forecast for Transmission Lines in the Williston/Tioga Region

(1)	(2)	(3)	(4)	(5)
Winter Peak	**2011 Forecast Load (Megawatts)[a]**	**2013 Forecast Load (Megawatts)[b]**	**Percentage Change in load forecast between 2011 and 2013**	**Annual percentage increase in load (2013 Forecast)**
2013-2014	454	568	25	-
2014-2015	481	660	37	16
2015-2016	509	752	48	14
2016-2017	538	804	49	7
2017-2018		863		7
2018-2019		909		5

[a] Basin Electric, 2011
[b] Basin Electric, 2013

The significant change in the load forecast led to a reevaluation of project need. The originally proposed project, as evaluated in the DEIS published in November 2012, considered the development of a single 345-kV transmission line and three new substations as part of one of two alternative routes. The proposed project was designed to increase transmission line capacity to meet the expected increase in load of 538 megawatts (MW) in 2016. However, the new load forecasts show the load increasing above and beyond the original forecast by nearly 50 percent. Therefore the original project as described in the DEIS would not achieve the increased capacity needs or reliability standards. This Supplemental DEIS evaluates three new project alternatives[1] that would construct additional transmission lines and additional new delivery substations or switchyards that would meet the new forecasted load of 909 MW expected to occur by 2018-2019 winter season.

The closest adequate transmission system support is the transmission infrastructure associated with the electrical power generation at AVS, located near Beulah. This system is operated at

[1] Project alternatives evaluated in this Supplemental DEIS incorporate the alternative route alignment evaluation and analysis conducted and presented in the DEIS (RUS, 2012). Routes selected as part of the DEIS analysis are used for development of the project alternatives evaluated in this Supplemental DEIS.

345-kV and 230-kV and extends west, south, and east from Beulah across several state boundaries. This IS transmission infrastructure is the inter-tie between the numerous electric generation facilities and the federal hydroelectric generation associated with the main-stem Missouri River.

1.2.2 Rural Utilities Service Purpose and Need

RUS is authorized to make loans and loan guarantees to finance the construction of electric distribution, transmission, and generation facilities including system improvements and replacements required to furnish and improve electric service in rural areas, as well as demand side management, energy conservation programs, and on- and off-grid renewable energy systems. Basin Electric is requesting financing assistance from RUS for the proposed 345-kV transmission line(s) and substations in Mercer, Dunn, McKenzie, Williams, and Mountrail counties. RUS's proposed federal action is to decide whether to provide financing assistance for the project; accordingly completing the NEPA process is one requirement, along with other technical and financial considerations in processing Basin Electric's application.

The Rural Electrification Act of 1936, as amended, (7 United States Code [U.S.C.] 901 et seq.) generally authorizes the Secretary of Agriculture to make rural electrification and telecommunication loans, including specifying eligible borrowers, references, purposes, terms and conditions, and security requirements.

RUS's agency actions include the following:

- Provide engineering reviews of the purpose and need, engineering feasibility, and cost of the proposed project.
- Ensure that the proposed project meets the borrower's requirements and prudent utility practices.
- Evaluate the financial ability of the borrower to repay its potential financial obligations to RUS.
- Review and study the alternatives to mitigate and improve transmission reliability issues.
- Ensure that adequate transmission service and capacity are available to meet the proposed project needs.
- Ensure that NEPA and other environmental requirements and RUS environmental policies and procedures are satisfied prior to taking a federal action.

1.2.3 Western Area Power Administration Purpose and Need

Pursuant to its obligations under the Federal Power Act, Western must consider and respond to Basin Electric's proposal for interconnection with the Williston Substation/Transmission Line.

Western's purpose and need is to consider the interconnection in accordance with its General Requirements for Interconnection. Western evaluates the interconnection and whether it meets the reasonable needs of the entity proposing the interconnection to its system. Western generally assumes responsibility to operate and maintain transmission facilities interconnected to its transmission system pursuant to the terms of an Interconnection Agreement or associated contracts.

1.2.4 U.S. Forest Service Purpose and Need

USFS has primary responsibility to issue special use authorizations for right-of-way (ROW) on National Forest System lands under the Federal Land Policy Management Act. USFS has been actively involved in preparing and reviewing this document per the requirements of 40 CFR 1506.3, and will use this analysis to make an independent decision related to the approval of the SUP submitted by Basin Electric to construct, maintain, and operate a transmission line through lands administered by USFS on the LMNG. The USFS proposed action is to authorize and subsequently issue a SUP with terms and conditions for the construction, maintenance, and operation of a transmission line through lands administered by USFS on the LMNG.

USFS' draft decision will be subject to the public objection processes described in 36 CFR Part 218 Subparts A and B. Objections will be restricted to specific written comments (defined in 36 CFR Part 218.1 and 218.5) that are within the scope of USFS' proposed action. After the objection process is complete, the USFS Supervisor of the Dakota Prairie Grasslands will issue a decision on whether or not to authorize the SUP to Basin Electric. The subsequent SUP, once issued, is not subject to further public appeal or objection.

1.3 REGULATORY FRAMEWORK/AUTHORIZING ACTIONS

A summary of the permits, regulations, consultations and other required actions that would be necessary for the project is provided in Chapter 6.

2.0 PROPOSED ACTION AND ALTERNATIVES

In the DEIS, two alternatives, A and B, along with a no-action alternative, were considered and evaluated. However, as indicated in Chapter 1 of this Supplemental DEIS, the increased electricity demand projections require more transmission line development to meet the need for the project, particularly in McKenzie County. As a result, a single transmission line constructed on Alternatives A or B no longer meets the project's purpose and need; therefore, these alternatives were eliminated from further consideration. In order to efficiently and reliably meet the increasing load demand projections, Basin Electric would need to construct additional transmission infrastructure and capacity, an additional interconnection with Western's Williston to Charlie Creek 230-kV transmission line, an additional 345-kV switchyard, and two 345/115-kV load-serving substations in the Williston Load Pocket area of McKenzie County. Three alternatives that would meet these requirements, and a no-action alternative, are evaluated in this Supplemental DEIS. Alternative C, combines Alternative A and portions of Alternative B (identified in the DEIS), and is shown in Figure 2-1. Alternative D is a modification of Alternative B that was identified in the DEIS (Figure 2-2), with the primary differences being the construction of 345/345-kV double-circuit lines north of Killdeer for 63 miles and the addition of the Red Switchyard and White and Blue substations as noted in Alternative C, along with an additional Killdeer South Switchyard and 345-kV line connections between the Red and Killdeer South switchyards. Alternative E is similar to Alternative D expect for the construction of two 345-kV lines running parallel north of Killdeer for 63 miles (Figure 2-3) to the proposed White and Blue substations (a total of 126 miles of line). Alternative E would also require an additional Killdeer South Switchyard and 345-kV connections between the Red and Killdeer South switchyards.

Because these new alternatives include many of the components of the two alternatives evaluated in the DEIS, information and analysis from the DEIS that is still relevant to the new alternatives are incorporated in this document through reference where possible.

Figure 2-1 Proposed Alternative C for the AVS Transmission Line

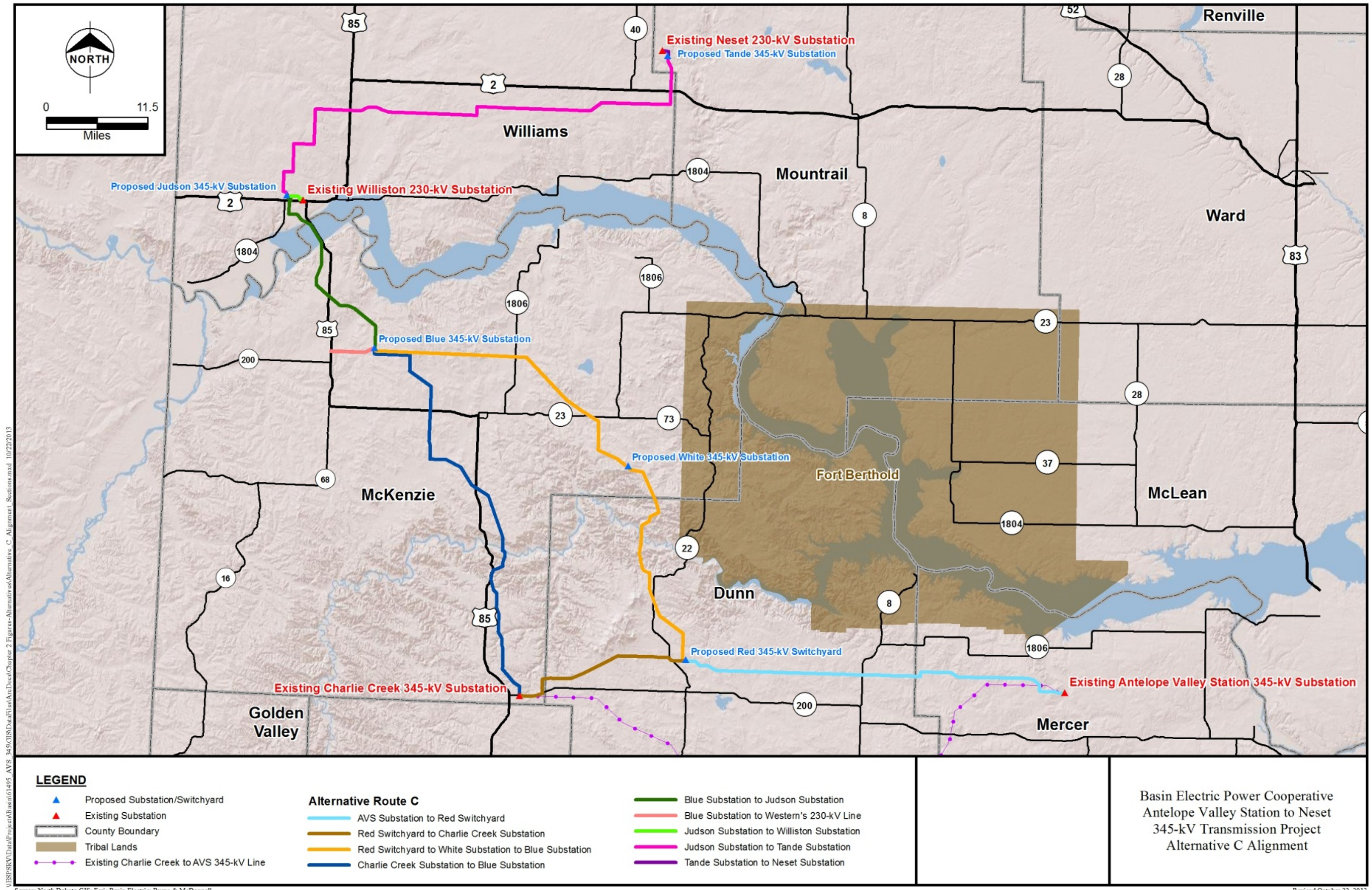
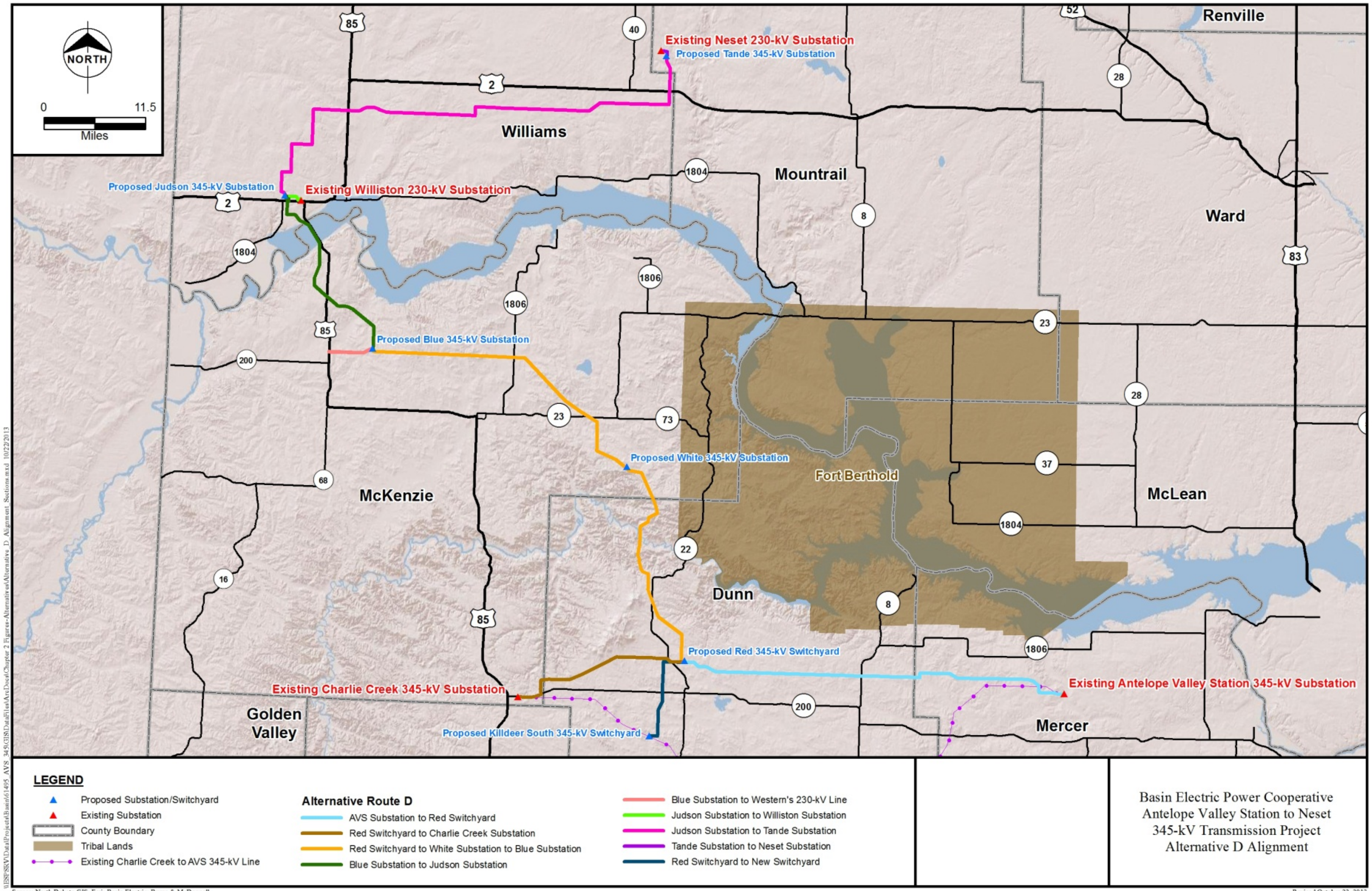
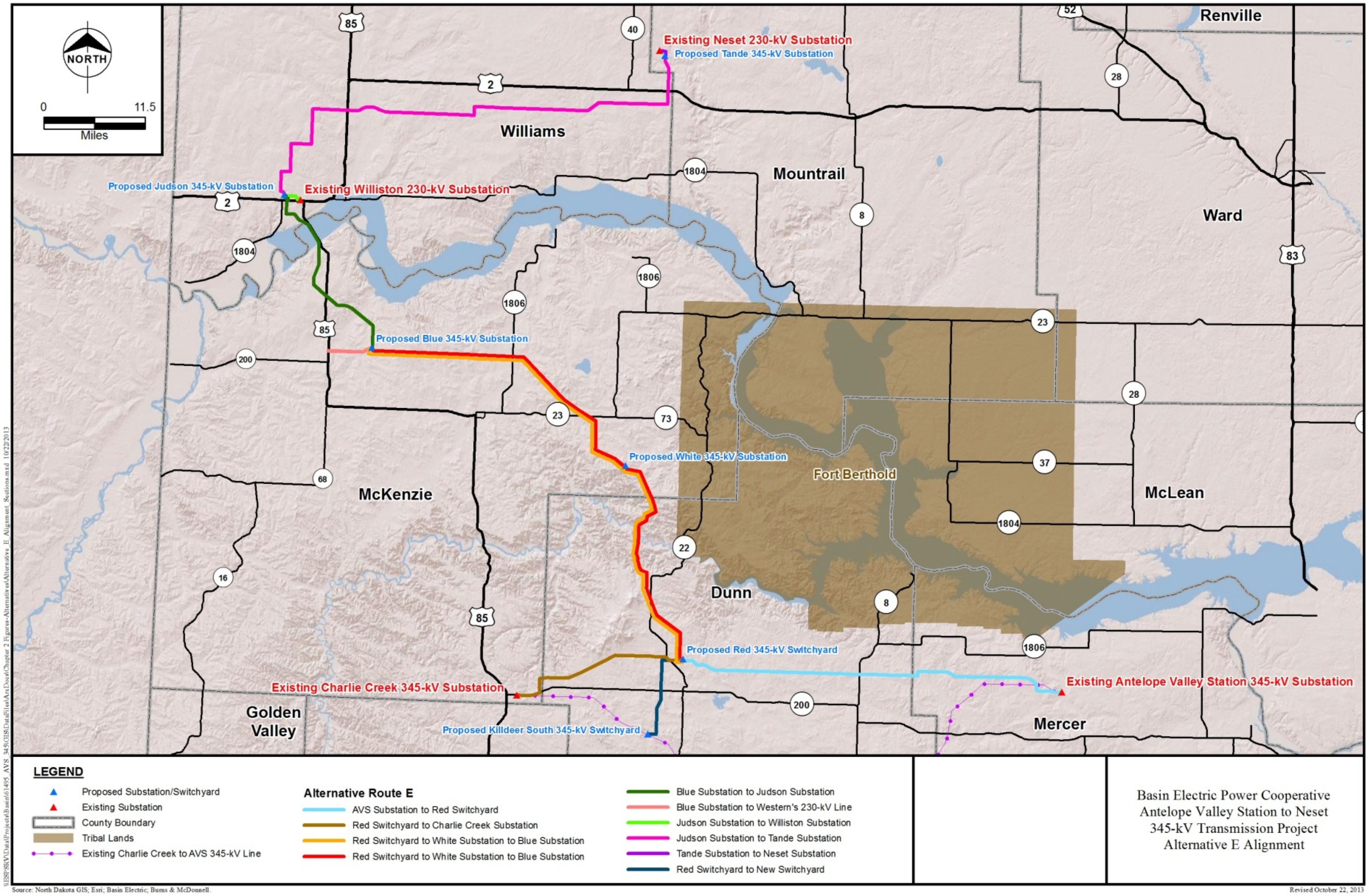


Figure 2-2 Proposed Alternative D for the AVS Transmission Line



Source: North Dakota GIS; Esri; Basin Electric; Burns & McDonnell. Revised October 22, 2013

Figure 2-3 Proposed Alternative E for the AVS Transmission Line



2.1 ALTERNATIVES CONSIDERED AND ELIMINATED FROM FURTHER CONSIDERATION

This section discusses the alternatives that have been considered throughout the planning process but were eliminated for various reasons from further consideration. These alternatives, as well as other alternatives considered as a result of the revised purpose and need for the project, are summarized below.

2.1.1 System Upgrades

As an alternative to constructing a new line, numerous operating scenarios and system facility upgrades were developed and evaluated for the IS system. These scenarios were modeled with the different line ratings, line carrying capacities, and system contingencies. The initial effort to improve the area transmission system focused on upgrade of local equipment to reduce system limitations. These improvements include a second 230/115-kV transformer at the Williston Substation, and second 345/230-kV transformers at both Belfield and Charlie Creek substations.

Area line ratings are increased by upgrading terminal equipment or actually raising transmission line structures to increase clearances to improve the line rating. These line rating increases have already or are scheduled to occur on the Richland-Williston 115-kV line, the Baker-Hettinger 230-kV line, and the Mandan-Dickinson-Belfield 230-kV line. To improve voltage profile, several capacitor bank installations are in progress at the existing Watford City, Kennaston, Grenora, Minot SW, and Logan substations.

In addition, 115-kV line improvements are underway. These include a new 115-kV line connecting the Blaisdell to Berthold substations and a new 115-kV line connecting the Snake Creek Pump Station to the Blaisdell and Tioga substations. These projects are being implemented through a shared effort of Basin Electric, its membership, and Western.

However, evaluation of these system upgrades indicated that this alternative would not meet the increased load forecast.

2.1.2 Additional 115-kV Lines

Constructing and operating several additional 115-kV lines based on predicted load growth were considered. Basin Electric member cooperatives identified these proposed new lines to serve specific loads. These transmission lines would not have been operated as part of the overall electricity transmission network and are needed with or without the proposed project. Identified lines include:

- MWEC 115-kV lines to serve the Tioga and Blaisdell areas
- MWEC 115-kV line between Watford City and Swenson

- 115-kV line connection between Snake Creek Pumping Station and Parshall with an interconnection at Blaisdell

Construction and operation by the different member cooperatives of these 115-kV facilities would mitigate many of the existing system limitations through 2014. These facilities would reduce loading on the McHenry-Souris 115-kV line, Logan-Tioga 115-kV line, and Charlie Creek-Williston 230-kV line, which could be transmission constraints during peak load conditions. However, many of the current system limitations, such as the potential for low voltages, voltage collapses, and transmission line overloads could still occur even with the construction and operation of the proposed new lines as early as 2015. The critical outage is the loss of the Charlie Creek-Watford City 230-kV line, which results in low voltages across northwest North Dakota and also overloads the Richland-Williston 115-kV line.

Based on the limitations of the system even with the proposed new lines and the subsequent NERC criteria violations, these projects would not fully meet the need of the proposed project in creating system reliability and therefore were not carried forward for analysis.

2.1.3 Alternative Corridors

Potential alternatives to address the inability of the current system to meet projected load forecasts beyond the 2014-2016 time period were identified and analyzed. These alternatives included an evaluation of numerous macro-corridors, as discussed in the DEIS and the RUS Macro-Corridor Report (Burns & McDonnell Engineering Company, 2011), for constructing additional 345-kV or greater voltage. Corridors for the development of alternative routes for project construction were identified in the macro-corridor analysis. Other macro-corridors were dismissed. A summary of these corridors and reasons for dismissal are provided below.

One macro-corridor evaluated and eliminated would run north from the AVS Substation to the existing Neset Substation near Tioga. This alternative would require the line to cross both the Fort Berthold Reservation and Lake Sakakawea. Crossing Fort Berthold Reservation would involve a lengthier approval process that would likely delay the project beyond 2016, leading to declines in the electric reliability of the region. Based on the project load growth of increases of approximately 15 percent in 2014 and 2015, the timeliness of project completion is critical, and this route creates a scenario that does not meet the need of the proposed project.

In addition, crossing Lake Sakakawea presents some insurmountable engineering challenges. The line would have to be placed at significant depths in the lake and would require specialized equipment that is normally used for ocean work and not available within the region. This would add significant costs and logistical issues to the project. For these reasons, this north corridor was eliminated from further consideration.

An additional macro-corridor that was considered and subsequently eliminated included a corridor that would have extended westward from the existing Charlie Creek Substation. This corridor would cross a significant distance of very rough terrain with limited access for structure placement. It would also cross significant areas of the LMNG and increase overall project length. This corridor would increase costs and create logistical obstacles for the project. Therefore, it was also eliminated from further consideration.

Another corridor evaluated and eliminated connected the Leland Olds Station to the Neset Substation by routing a 345-kV line around the east side of Lake Sakakawea. Leland Olds Station is located near Stanton, North Dakota approximately 18 miles east of AVS. This corridor would extend northward towards Minot, connecting at the existing Logan Substation, extending westward to connect with the proposed Tande Substation, and finally terminating at the existing Neset Substation. This alternative would cross the Missouri River, be adjacent to significant U.S. Department of the Interior, Fish and Wildlife Service (USFWS) refuge complexes, and cross hundreds of miles of the Missouri Coteau region that includes significant wetland resources and migratory waterfowl nesting and stopover habitat. Although the electrical delivery capacity of the this alternative to the Tioga area is similar to the alternatives being carried forward, this alternative would not address the added load-serving capacity in McKenzie County and Alternatives C, D, and E would still be required to meet the overall project purpose and need. As a result of the additional infrastructure required, length of line, and the potential for additional environmental consequences, this alternative was eliminated from further consideration.

All routes considered would require crossing the Missouri River and/or Lake Sakakawea. Several of the corridors eliminated would cross significant areas of topographic relief and limited access, as well as more remote, undisturbed natural areas. Of all the corridors considered, the corridors for Alternatives A and B were determined to best avoid these constraints, and route alignments within these corridors are considered fully in the Supplemental DEIS. Constructing the AVS-to-Charlie Creek-to-Judson-to-Tande-to-Neset with the North Killdeer Loop using 345-kV transmission lines with associated substations and interconnections was determined to best satisfy the project's purpose and need.

2.1.4 New 345-kV Line with Two Parallel 345-kV Lines, Charlie Creek to Judson

One alternative to constructing and operating the single 345-kV North Killdeer Loop circuit between the Red Switchyard and Blue Substation would be to construct two parallel 345-kV lines between the Charlie Creek Substation and the Blue Substation. These parallel lines would follow the proposed alignment of Alternative C between the Charlie Creek and Blue substations. This alternative would provide adequate power delivery to McKenzie County. The primary obstacle for construction of two parallel lines from Charlie Creek Substation to the Blue Substation would be the intrusion into the USFS managed lands east of U.S. Highway 85 and east of the Theodore Roosevelt National Park (TRNP). To maintain power delivery in the event that one line fails as part of a catastrophic event or natural disaster, such as tornadoes or icing, the two circuits would need to be constructed on separate poles on separate alignments. The separation between the lines would need to be a minimum of 150 feet—centerline to centerline. Two sets of structures would increase the visual impact of the project, and, in addition, it is likely that one set would be located outside the USFS preferred utility corridor along the east side of U.S. Highway 85. Furthermore, the terrain east of U.S. Highway 85, which cuts into the Little Missouri River Valley, would force a second parallel line up to higher ground adjacent to the road corridor causing the second line to be more visible from the TRNP and the USFS designated Roadless areas (Lone Butte and Long X Divide). North of this area, the parallel lines would also cross LMNG parcels that were avoided or minimized in the routing of Alternative C as a single 345-kV line. Most notably, a parallel line further east of the Alternative C alignment would extend into the Lone Butte designated Roadless area and would not be consistent with USFS management activities for that area. Additionally, having two 345-kV lines within relative proximity increases the risk of regional power delivery failure to this critical area from a catastrophic event.

2.1.5 New 500-kV line AVS to Williston Area to Neset

Several alternatives were considered that evaluated constructing a 500-kV line. These included a single 500-kV line within a retained macro-corridor or a combination of single 345-kV lines between AVS and Charlie Creek and Judson and Tande along with a single 500-kV line between Charlie Creek and Williston to provide additional capacity within the service area. While the construction of a 500-kV line could address the system capacity needs of the project purpose and need, no other 500-kV facilities are present within the project area. Thus, development of a 500-kV line would require significant expansion and possible relocation of numerous substations throughout the area to accommodate the 500-kV transformers and other equipment, including AVS, Charlie Creek, and Judson, which increase project cost and timeline. In addition, constructing a 500-kV line would require a larger ROW and increased tower height. It is expected that the environmental impacts of this alternative would exceed those of other alternatives given the number of facilities that would need to be constructed or modified to satisfy the technical requirements.

2.1.6 Additional Generation

The results of the power supply study (IS, 2011) indicate that between 2012 and 2016 several local distribution transmission line projects will be required to correct deficiencies at specific locations. In addition, the study notes that voltage support would be required at strategic locations to prevent any interruptions of service on the existing transmission lines that would result from the increased thermal loading because of voltage or current flow fluctuations on the lines due to the increasing electrical demand. In response to those studies, Basin Electric is developing the Pioneer Generation Station, near Williston and the Lonesome Creek Station, near

Alexander in order to provide the necessary voltage support during periods of peak demand in the region.

Phase I of both projects will include a 45-MW simple cycle combustion turbine. Both Phase I projects will be in-service by mid-2013. Phase II of both projects consists of placing two additional 45-MW simple cycle combustion turbines at each location. The two Phase II projects are scheduled to be completed in 2014 and 2015. These projects, consisting of approximately 270 MW of capacity, are needed to protect the reliability of power delivery and load-serving capacity of the region of the proposed AVS to Neset Transmission Project. Further, since they are intermediate and peaking resources that can chase load, they are ideal for addressing the immediate power needs in this area, but will provide reliable peaking power for the whole IS once the AVS to Neset Transmission Project is completed, and will be an ideal complementary form of generation to any additional wind resource that is added to the IS in the future. Since most of the new load in northwest North Dakota is of a 24-hour-a-day, 7-days-a-week, 365-days-a-year variety, wind is a not an available option to supply this new load. Once natural-gas-combustion-turbine generation is available, wind becomes an option as a complementary generation resource as base load generation needs increase. The addition of these resources will avoid and mitigate additional impacts from generation to serve load in the region.

Further, this new generation will avoid and displace portable generation and combustion-engine-driven oil and gas extraction engines at the wells. It will also hasten the capture of more of the natural gas at the well-heads, and avoid both the flaring and release of natural gas during the oil extraction process.

New generation built to serve the growing load on the IS since 2000 has been almost exclusively wind and natural gas, including:

- more than 700 MW of new wind generation capacity owned or purchased through power-purchase contracts by Basin Electric,
- approximately 300 MW of natural-gas-combined-cycle generation owned and operated by Basin Electric that began commercial operation in August 2012 near White, South Dakota, and
- approximately 380 MW of natural-gas-combustion-turbine generation owned and operated by Basin Electric near Groton, South Dakota, and Culbertson, Montana.

The purpose of the AVS to Neset Transmission Project is to increase high voltage transmission line system reliability and the transmission load-serving capacity in the region. Once the AVS to Neset Transmission Project is completed, new additional natural-gas-peaking power would become more readily available to all IS customers, not just the customers in northwest North Dakota. As such, development of additional generation, without considerable additional transmission capacity, would not meet the regional load requirements. Except for voltage support type projects, sufficient regional electrical generation is available to serve the region. However, limited transmission capacity prevents it from being accessible to serve the regional demand. As a result, additional generation is not required, nor would it meet the purpose and need for the project, and was therefore dropped from further consideration.

2.2 SELECTION OF PROJECT ALTERNATIVES

NEPA requires that an EIS consider a full range of alternatives to the proposed action and fully evaluate all reasonable alternatives. In addition, the EIS must also consider the no-action alternative. For the AVS to Neset Transmission Project, alternatives consist of individual route segments that, when combined, form various complete route alignment alternatives within each macro-corridor between the proposed endpoints. Figures 2-1, 2-2, and 2-3 show the individual, 1,000-foot-wide alternative route corridors located within the 6-mile-wide macro-corridors that were identified for the proposed project after consideration of several macro-corridors and numerous route corridors within each retained macro-corridor. Chapter 2 of DEIS describes the route development process and routing principles used to develop alternative route corridors for the project (DEIS, Section 2.2. p. 2-3). The DEIS also describes the public and agency review process for the project and the revisions that were made to the preliminary alternatives under consideration based on concerns raised by agencies and the public (DEIS, Section 1.4.2, p 1-20).

Two route alternatives were identified and evaluated in the DEIS. Initially, these alternative routes were identified as two separate route alternatives for the construction and operation of a new 345-kV line. With the increase in load forecast requirements for the area, these two alternative routes were combined into a single alternative consisting of numerous line segments and interconnections to both the existing and new substations necessary to meet the project purpose and need. Each alternative route segment is defined as a 150-foot-wide ROW within a larger 1,000-foot-wide route corridor. It is likely that as the project continues to be developed, conditions will be identified or encountered during survey, engineering, ROW acquisition, and construction, and the Public Service Commission may require changes (should the project be approved) that may require Basin Electric to make adjustments to these route segments or substation locations. These adjustments would address specific localized conditions, circumstances, and landowner requests not readily apparent as part of the route development and environmental review process and would not be anticipated to result in substantial (if any) additional or different impacts. Any adjustments would generally be intended to reduce overall environmental impacts, reduce project inconvenience to landowners, and/or protect public safety. To the extent these adjustments are identified during the environmental review process and vary from the alignment considered in this Supplemental DEIS, the revised alignment and its characteristics and potential impacts will be assessed in the Final EIS. A detailed description of the alternatives is provided below.

2.3 ALTERNATIVES CONSIDERED IN THE SUPPLEMENTAL DEIS

2.3.1 No-action Alternative

Under the no-action alternative, the AVS to Neset Transmission Project would not be constructed. The existing environment within the project area would remain the same and no land would be used for transmission lines, facilities, or substations. The no-action alternative does not meet the identified purpose and need for the project. Under this alternative, it is expected that load growth will increase beyond the load-serving capacity of the existing transmission system for the Williston/Tioga region by 2016, resulting in transmission system reliability issues and violating the criteria established by NERC for transmission reliability in the region. Moreover, if the transmission lines are not built, it is probable that oil and gas operations would develop alternative sources of electrical power, including the use of diesel generators, which could potentially lead to greater environmental impacts.

2.3.2 Alternative C

In the DEIS, two alternatives, A and B, were considered and evaluated. However, as indicated in Chapter 1 of this Supplemental DEIS, the increased electricity demand projections require more transmission line development to meet the need for the project, particularly in McKenzie County. Basin Electric determined that construction of new transmission facilities along Alternative A, considerable portions of Alternative B, an additional interconnection with Western's Williston to Charlie Creek 230-kV transmission line, and two 345/115-kV load-serving substations would be required. This alternative, combining Alternative A and portions of Alternative B, is identified as Alternative C and is evaluated in further detail in this Supplemental DEIS (see Figure 2-1).

Alternative C includes approximately 278 miles of transmission line, including 265 miles of new 345-kV transmission line and 13 miles of new 230-kV line, four new substations, one new switchyard, and additional equipment, but no expansion, to four existing substations (see Figure 2-1). Alternative C includes the following characteristics with each segment color coded on Figure 2-1:

- 45 miles of 345-kV transmission line connecting the AVS Substation to a new Red Switchyard near Killdeer (light blue)
- 21 miles of 345-kV transmission line connecting the Red Switchyard to the existing Charlie Creek Substation (brown)
- 27 miles of 345-kV transmission line connecting the Red Switchyard to the new White Substation and 36 miles of 345-kV transmission line connecting the White Substation to the new Blue Substation (yellow)
- 51 miles of 345-kV transmission line from the Charlie Creek Substation to the Blue Substation (dark blue)

- 24 miles of 345-kV transmission line from the Blue Substation to the proposed Judson Substation (dark green)
- Two 230-kV single-circuit transmission lines running parallel for 5 miles connecting the Blue Substation to Western's 230-kV transmission line (orange)
- 2 miles of 230/115-kV double-circuit transmission line connecting the proposed Judson Substation to the Williston Substation (light green)
- 61 miles of 345-kV transmission line connecting the proposed Judson Substation to the proposed Tande Substation, approximately 31 miles of which would be double-circuited with a MWEC 115-kV line associated with other regional improvement projects (pink)
- 1 mile of 230-kV transmission line connecting the proposed Tande Substation to the Neset Substation (purple)

Judson, Tande, and Blue 345/230-kV Substations

The proposed Judson and Blue substations would be constructed to interconnect the proposed 345-kV lines to Western's Williston Substation and to Western's Williston to Charlie Creek 230-kV transmission line along U.S. Highway 85 south of the Missouri River, respectively. Basin Electric's Tande Substation would be constructed to interconnect the 345-kV transmission system to the existing 230-kV system at Basin Electric's Neset Substation located near Tioga. The Judson and Tande substations would occupy approximately 12 acres of land. The Blue Substation consists of both 345/230-kV and 345/115-kV equipment, therefore a 25 acre parcel would be required.

Red Switchyard and White and Blue 345/115-kV Substations

In order to interconnect the proposed 345-kV lines into the local 115-kV system and serve the load demands of the Williston Load Pocket and surrounding area, a new 345-kV switchyard and two new 345/115-kV substations would be constructed along the 345-kV system (Figure 2-1). The Red Switchyard would be located near Killdeer. The White Substation would be located north of the Red Switchyard, east of Watford City. The Blue Substation would be located south of the Missouri River. The Red Switchyard and White Substation would occupy approximately 12 acres of land. The Blue Substation site would be approximately 25 acres because it would also include a 345/230-kV component as noted above.

Route Alignment

The alignment for the 345-kV lines and associated facilities are shown on Figure 2-1. Throughout the environmental review process, Basin Electric continued engineering development of the project and worked with agencies and landowners to address potential project-related concerns. Since release of the DEIS, a number of adjustments to components of the project, including both the alignment of 345-kV line segments, an additional 345/230-kV interconnection, and the location of several new load-serving substation sites have been made. These adjustments have been designed to address agency and landowner concerns and reduce overall project-related impacts on property owners, land use, and natural resources. Additionally, the overall purpose and need for the project has changed substantially—requiring additional 345-kV lines, transmission system interconnection, and substations/switching stations. Figure 2-1 shows the facilities and transmission line route alignment for Alternative C.

2.3.3 Alternative D

Alternative D is a modification of Alternative B identified in the DEIS (DEIS, Figure 2-4). The primary differences is that Alternative D includes constructing a 345/345-kV double-circuit lines north of Killdeer for 63 miles, the additional Killdeer South 345-kV Switchyard, a 345-kV transmission line connection between the Red Switchyard with the existing AVS to Charlie Creek 345-kV transmission line (via the Killdeer South Switchyard), and the addition of the Red Switchyard and White and Blue substations (also included as part of Alternative C). Alternative D would include construction of approximately 251 miles of transmission line beginning at the AVS Substation and ending at the Neset Substation, including 13 miles of new 230-kV line and 238 miles of new 345-kV transmission line, of which 63 miles would be 345/345-kV double-circuit. Alternative D would also include construction of four new substations, two switchyards, and equipment additions but no expansion to the four existing substations. Alternative D includes the following characteristics with each segment color coded on Figure 2-2:

- 45 miles of 345-kV transmission line connecting the AVS Substation to a new Red Switchyard near Killdeer (light blue)
- 21 miles of 345-kV transmission line connecting the Red Switchyard to the existing Charlie Creek Substation (brown)
- A new Killdeer South Switchyard south of Killdeer along Basin Electric’s existing AVS to Charlie Creek 345-kV transmission line
- Two 345-kV single-circuit transmission lines running parallel for approximately 12 miles between the Red Switchyard and the new Killdeer South Switchyard (blue)
- 27 miles of 345/345-kV double-circuit transmission line connecting the Red Switchyard to the new White Substation and 36 miles of 345/345-kV double-circuit transmission line connecting the White Substation to the new Blue Substation (yellow)
- 24 miles of 345-kV transmission line from the Blue Substation to the proposed Judson Substation (dark green)

- Two 230-kV, single-circuit transmission lines running parallel for 5 miles connecting the Blue Substation to Western's 230-kV transmission line (orange)
- 2 miles of 230/115-kV double-circuit transmission line connecting the proposed Judson Substation to the Williston Substation (light green)
- 61 miles of 345-kV transmission line connecting the proposed Judson Substation to the proposed Tande Substation, approximately 31 miles of which would be double-circuited with a MWEC 115-kV line associated with other regional improvement projects (pink)
- 1 mile of 230-kV transmission line connecting the proposed Tande Substation to the Neset Substation (purple)

The transmission line structures would be the same as those noted for Alternative C and shown in Figures 2-4 to 2-8, plus the 345/345-kV double-circuit structure illustrated in Figure 2-9.

2.3.4 Alternative E

Alternative E would include constructing two parallel 345-kV lines between the Red Switchyard and the Blue Substation, along the eastern corridor. Alternative E, like Alternative D, is also a modification of Alternative B from the DEIS (DEIS, Figure 2-4). Alternative E would be the same as Alternative D with the primary difference being the construction of two parallel 345-kV transmission lines north of Killdeer for 63 miles rather than a double-circuit 345/345-kV line proposed as part of Alternative D. Alternative E would include construction of approximately 314 miles of transmission line beginning at the AVS Substation and ending at the Neset Substation, including 13 miles of new 230-kV line and 301 miles of new 345-kV transmission line, of which 126 miles (63 miles times two) would be two single-circuit 345-kV parallel lines. Alternative E would also include construction of four new substations, two switchyards, and equipment additions but no expansion to four existing substations. Alternative E includes the following characteristics with each segment color coded on Figure 2-3:

- 45 miles of 345-kV transmission line connecting the AVS Substation to a new Red Switchyard near Killdeer (light blue)
- 21 miles of 345-kV transmission line connecting the Red Switchyard to the existing Charlie Creek Substation (brown)
- A new Killdeer South Switchyard south of Killdeer along Basin Electric's existing AVS to Charlie Creek 345-kV transmission line
- Two 345-kV single-circuit transmission lines running parallel for approximately 12 miles between the Red Switchyard and the new Killdeer South Switchyard (blue)
- 27 miles of two single-circuit parallel 345-kV transmission lines connecting the Red Switchyard to the new White Substation and 36 miles of two single-circuit, parallel

345-kV transmission lines connecting the White Substation to the new Blue Substation (yellow)

- 24 miles of 345-kV transmission line from the Blue Substation to the proposed Judson Substation (dark green)
- Two 230-kV single-circuit transmission lines running parallel for 5 miles connecting the Blue Substation to Western's 230-kV transmission line (orange)
- 2 miles of 230/115-kV double-circuit transmission line connecting the proposed Judson Substation to the Williston Substation (light green)
- 61 miles of 345-kV transmission line connecting the proposed Judson Substation to the proposed Tande Substation, approximately 31 miles of which would be double-circuited with a MWEC 115-kV line associated with other regional improvement projects (pink)
- 1 mile of 230-kV transmission line connecting the proposed Tande Substation to the Neset Substation (purple)

The transmission line structure types would be the same as those noted for Alternatives C and D and shown in Figures 2-4 to 2-9.

2.4 ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

There are several elements common to each of the alternatives, including various transmission line components, substation components, construction techniques, and operation and maintenance procedures. These items are discussed in more detail below.

2.4.1 Transmission Line Characteristics

The proposed 345-kV, single-circuit transmission line would be constructed using single-pole or H-frame self-supporting structures within a 150-foot-wide ROW. Double-circuit 345/345-kV, 345/115-kV, and 230/115-kV lines would be constructed using single-pole, self-supporting structures. Detailed construction access considerations and construction techniques are described further in the following sections. Several transmission line structure types would be necessary to address the various voltages, terrain, and connector scenarios included as part of different components of the proposed project. Structures proposed for this project by Basin Electric are shown in Figures 2-4 through 2-9. A summary of Basin Electric's proposed structure characteristics for each of these structure types is provided in Table 2-1.

Project construction and design would meet the requirements of the National Electrical Safety Code (NESC)-Heavy Loading District, RUS design criteria (USDA, 2009a), and other applicable local or national building codes (Institute of Electrical and Electronics Engineers Standards Association, 2012). The Heavy Loading District refers to those areas (including North Dakota) that are subject to severe ice and wind loading. Minimum conductor clearance is measured at the point where conductor sag is in closest proximity to the ground. The proposed transmission line would be constructed with clearances that exceed standards set by NESC.

Table 2-1: AVS to Neset Transmission Project Typical Structure Design Characteristics

Description of Design Component[c]	345-kV (Fig 2-4)	230/115-kV (Fig 2-5)	345/115-kV (Fig 2-6)	230-kV (Fig 2-7)	345-kV H-Frame (Fig 2-8)	345/345-kV (Fig 2-9)
Conductor size (inches)	1.8	1.345/1.108	1.8/1.108	1.345	1.8	1.8
ROW width (feet)	150	100	150	100	150	150
Typical minimum and maximum span distance between structures (feet)[a]	650-1,100	700-900	650-1,000	650-950	900-1,000	650-1,000
Average span (feet)	900	800	800	800	1,000	900
Minimum and maximum structure height (feet)	100-130	97-127	115-145	70-110	80-100	100-155
Average height of structures (feet)	115	112	130	95	90	130
Average number of structures per mile	6	6.5	6.5	6.5	5.5	6
Temporary disturbance per structure (acre)[b]	0.4	0.4	0.4	0.4	0.4	0.4
Temporary disturbance per mile (acre)	4.0	4.0	4.0	4.0	4.0	4.0
Permanent disturbance per structure (acre)	0.0003	0.0002	0.0003	0.0002	0.0004	0.0003
Minimum conductor-to-ground clearance to agricultural lands, rural roads, and paved highways at 100 degrees Celsius (feet)	30	26	30	26	30	30
Minimum conductor-to-ground clearance to railroads at 100 degrees Celsius (feet)	As required by specific railroad					

[a] Actual span distance will vary depending on topography.

[b] Angle and dead-end structures (for longitudinal stability) would be constructed with concrete foundations. Guy wires would not typically be required.

[c] Single pole tangent structures would be freestanding on concrete foundations. H-frame tangent structures would likely be directly embedded into the ground.

Figure 2-4: 345-kV Single Circuit Structure

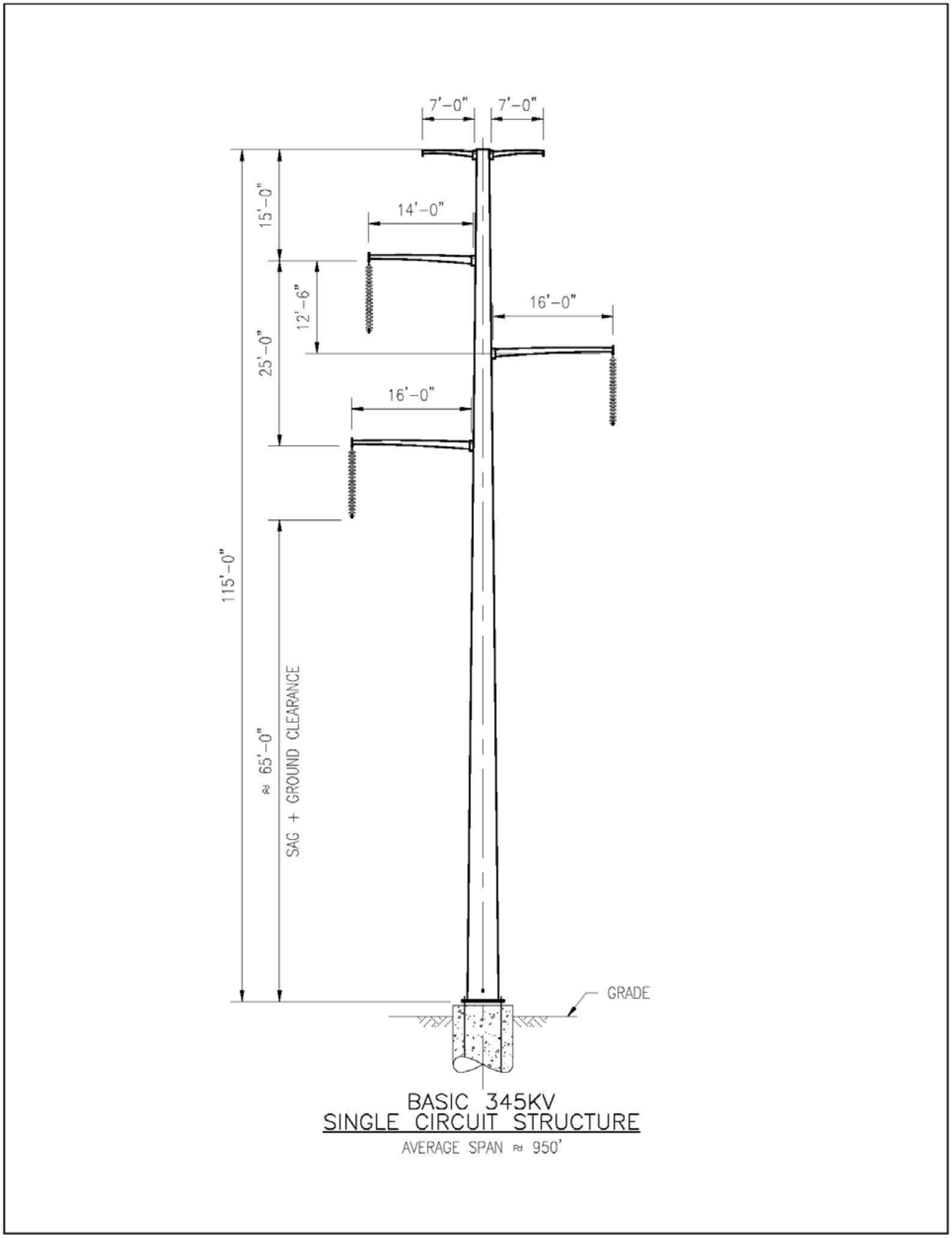


Figure 2-5: 230/115-kV Double Circuit Structure

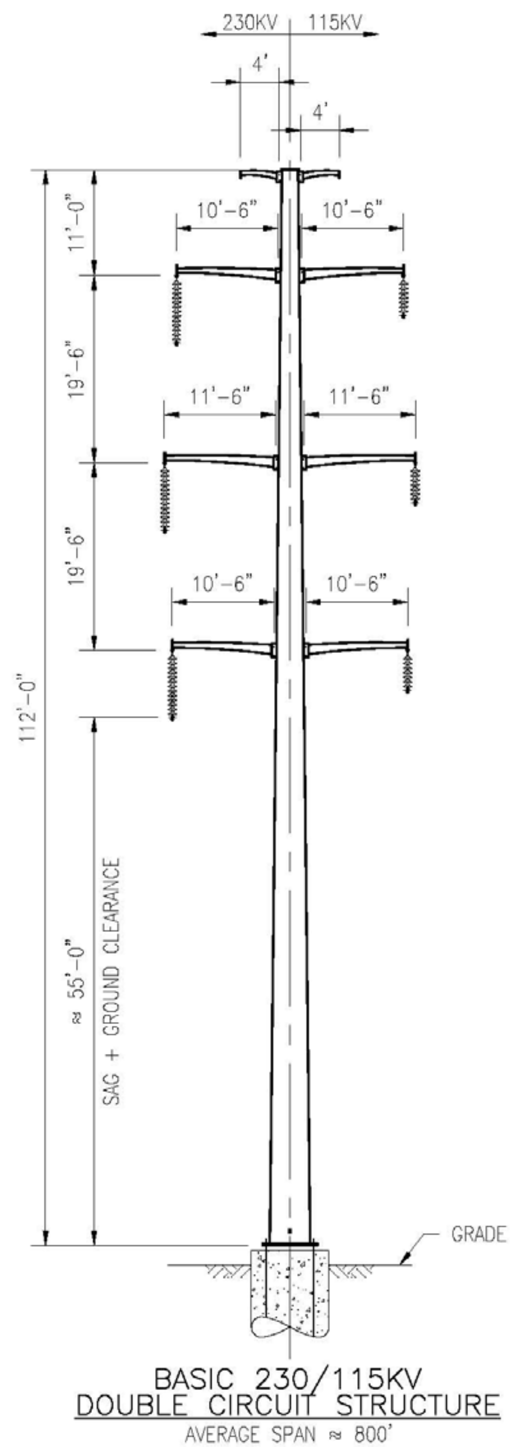


Figure 2-6: 345/115-kV Double Circuit Structure

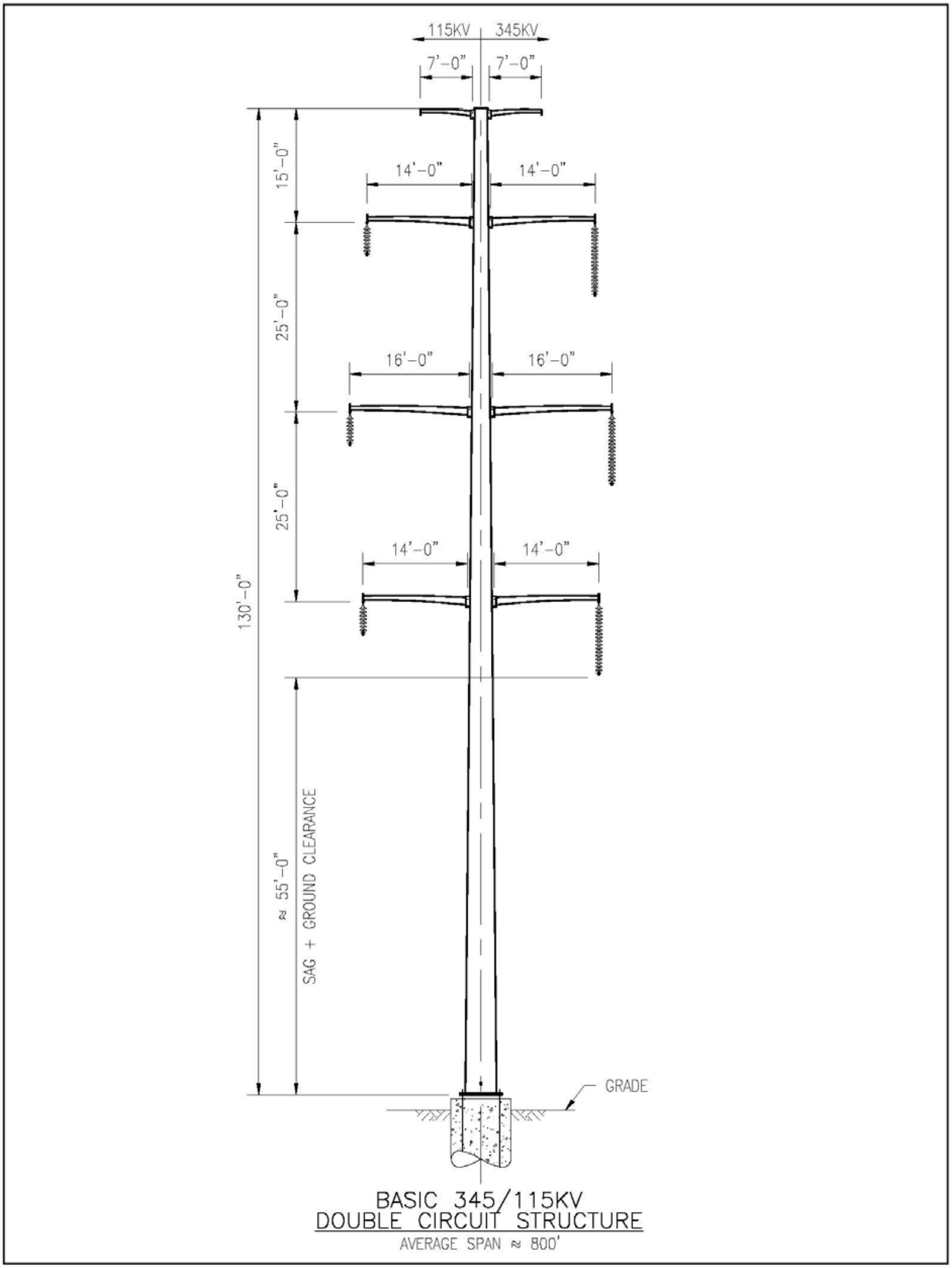


Figure 2-7: 230-kV Single Circuit Structure

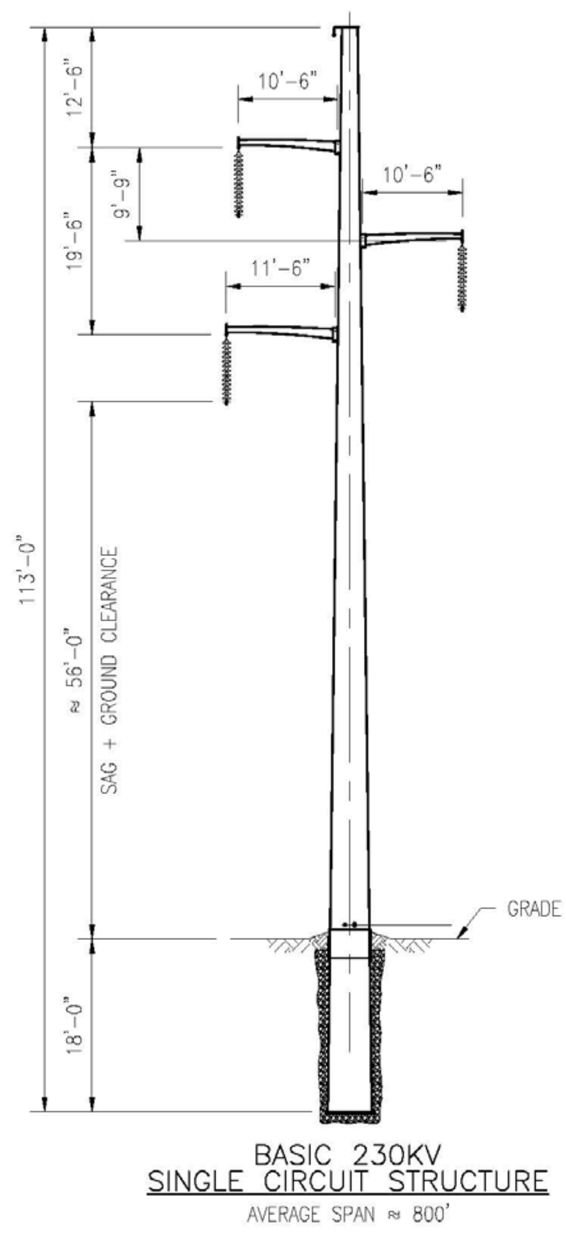


Figure 2-8: 345-kV Single Circuit H-Frame Structure

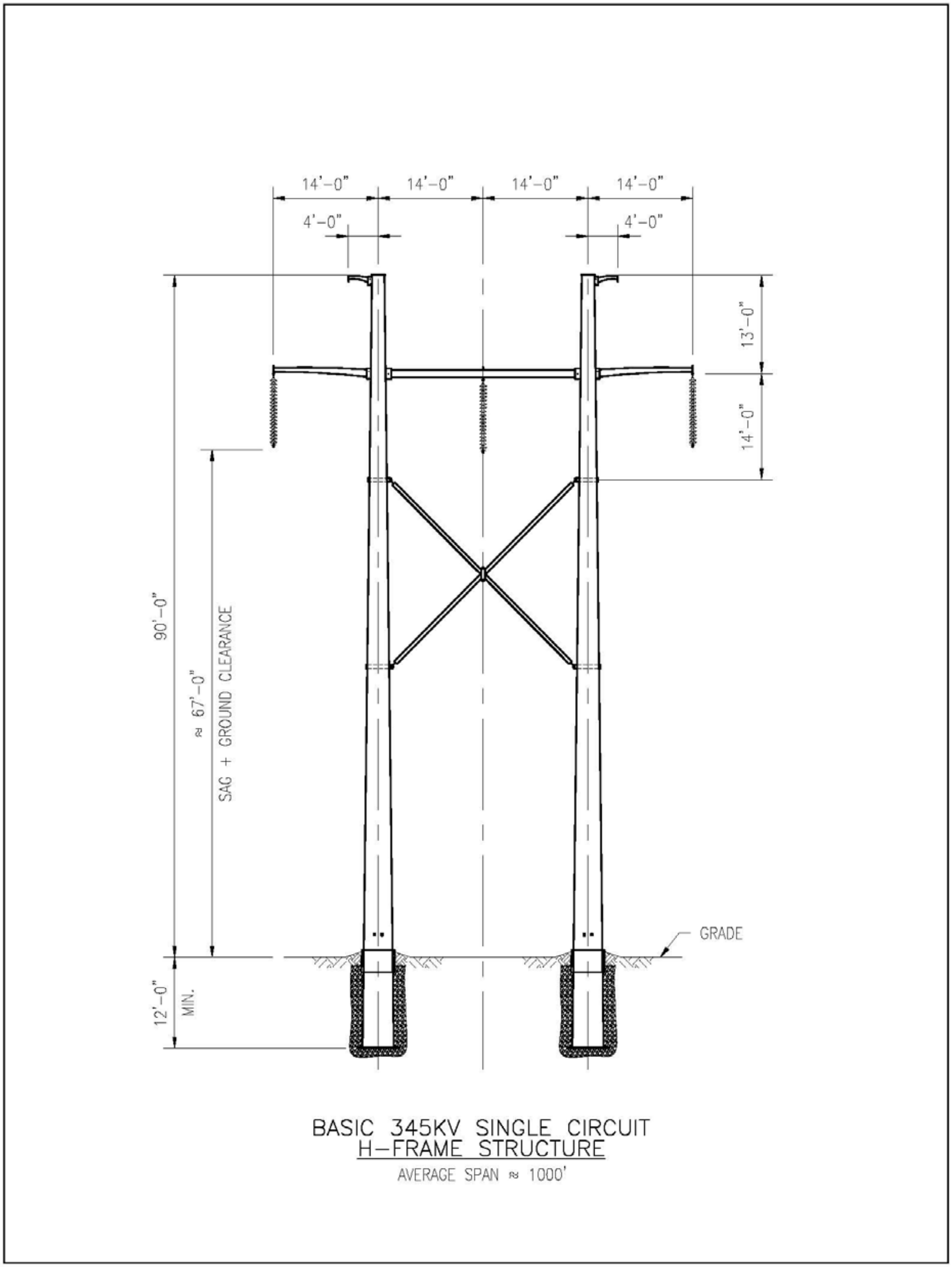
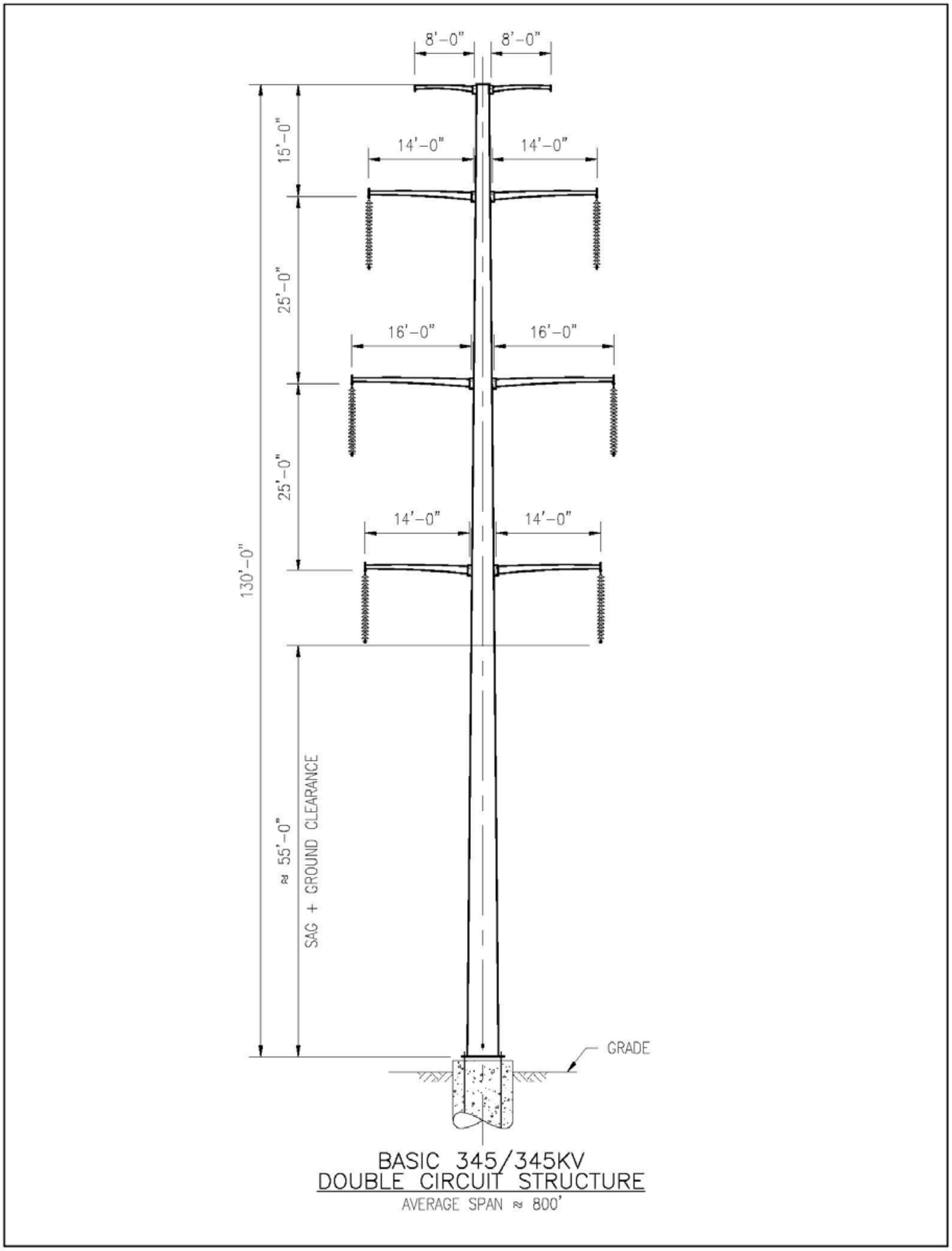


Figure 2-9: 345/345-kV Double Circuit Structure



2.4.2 Transmission Line and Substation Construction

Pre-construction Activities

Basin Electric and/or its contractors would perform engineering surveys prior to construction of the transmission line. These surveys would consist of centerline location, profile, and access surveys. Pre-construction surveys would likely coincide with other pre-construction activities.

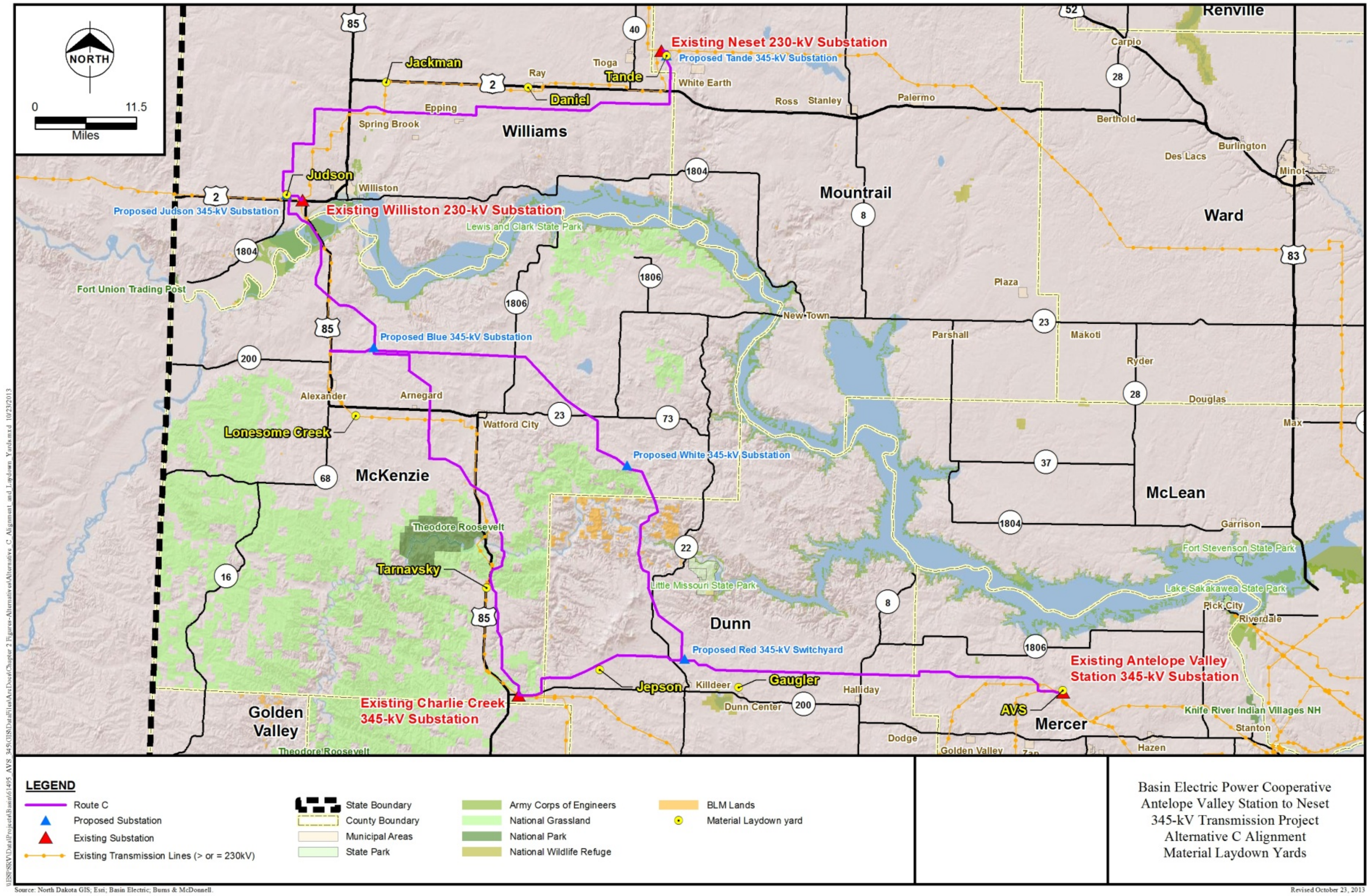
Geotechnical studies would be conducted along the transmission line route to determine engineering requirements for structures and foundations. Truck-mounted augers would be transported to selected locations to drill small-diameter boreholes, and borehole cuttings would be analyzed to determine specific soil characteristics. These activities would be conducted after harvest to minimize impacts on agricultural fields. Minimal land disturbance (approximately 400 square feet) would be anticipated for each geotechnical boring site. Additionally, small access trails may be required for some of the boring locations.

Approximately ten temporary construction material and equipment laydown areas would be used for the duration of construction. Figure 2-10 shows the location of proposed material laydown areas that have been identified. These laydown areas would be approximately 5 acres.

Where feasible, construction laydown areas are typically located at previously disturbed or developed locations such as vacant lots, existing utility yards, or parking lots to avoid or minimize impacts on sensitive resources. If existing yard locations are not available, preferred locations for yards would be undeveloped areas, such as grazing or cropland that are cleared and flat; have all-weather access; and do not contain streams, wetlands, or other environmentally sensitive resources. Laydown yards would typically consist of flat or gently sloping lands where construction material would be placed on pallets or cribbing. It is expected that these areas would not require removal of vegetation or topsoil and would require minimal if any re-grading. Laydown areas would be returned to pre-construction conditions upon completion of the project.

Vegetation removal within the ROW is anticipated to be minimal throughout a large portion of the project, especially in rangeland and cropland areas. In more forested portions of the ROW, trees and shrubs would be removed if they interfere with construction activities or the safe and reliable operation of the transmission line. Vegetation would be removed at ground level to provide access to the ROW. Disposal of trees and shrubs would be consistent with the landowner's wishes and all state waste management regulations. It is expected that the woody species removed would be replaced at a minimum 2:1 ratio. Final replacement species and quantities would be determined after a tree and shrub inventory has been completed on the final alignment and would be stipulated for the project through the NDPSC's siting process.

Figure 2-10: Temporary Construction Material and Equipment Laydown Areas



Transmission Structure Site Preparation

Transmission structure site clearing is expected to be minimal over a large portion of the project because much of the ROW would be located across rangeland, grasslands, or agricultural areas. In these areas, site leveling is expected to be minimal. In areas of difficult terrain, structure location sites may require more extensive leveling using bulldozers or front-end loaders to ensure the safe operation of equipment. In areas where access is extremely difficult, structure placement would be performed through the use of helicopters. All blading and leveling would occur within the boundary of the ROW throughout the length of the project. Soil removed during leveling of structure sites would be stockpiled nearby and replaced following construction. Disturbed ground would be re-graded to as close to pre-construction condition as appropriate for stabilization and revegetated or approved for tillage depending on pre-construction land use.

Structure holes would be drilled by truck-mounted auger or power auger at identified structure locations along the length of the ROW. Total land disturbance at each structure location would vary depending on location (i.e., level terrain versus steep, rugged terrain) and structure type. All disturbances related to the boring of structure holes would be confined to the ROW.

Structures used for the project would be either directly imbedded into the ground or bolted on reinforced poured concrete foundations. Determinations on whether a structure would be directly imbedded into the hole or require a foundation would be based on access, terrain, and soil conditions. Between 1,465 and 1,835 structures (depending on the alternative) would be used for the proposed project, with an average of approximately six structures per mile.

Structure Assembly and Erection

Structure components such as pole segments, davit arms, hardware, and insulators would be brought to the structure site via truck and assembled on-site. Davit arms, insulators, and other components would be attached to the structure while on the ground. The bottom section of the structure would be placed into the boreholes and backfilled or bolted onto reinforced foundations using cranes or large boom trucks. In areas of very rough terrain that are inaccessible or have limited accessibility, such as those areas around the Little Missouri River or Missouri River Badlands, some aerial placement of structures by helicopter may be required. The upper sections of the structure would then be bolted onto the lower section. Structure setting activities would be done within the boundaries of the ROW. Conductor pulling may require some work outside of the permanent ROW but within the area of the construction easement.

Stringing and Tensioning of Conductors

Following structure erection, crews would install the conductor wires, overhead groundwire (OHGW), and an optical groundwire (OPGW) using conductor stringing sheave blocks and line pulling and tensioning equipment. The conductor, OHGW, and OPGW are kept under tension during the stringing process to keep the conductor clear of energized circuits, the ground, and obstacles that could damage the conductor, OHGW, and OPGW surfaces.

Pulling and tensioning sites are typically located at 8,000 to 9,000-foot intervals or at angle point structures. Sites along tangent structures are located within the construction ROW; those at angle points typically are located partially outside of the permanent ROW. Stringing equipment consists of wire pullers, tensioners, conductor OHGW and OPGW reels, and sheave blocks. After the conductors, OHGW, and OPGW are pulled for a section of line, they are tightened or sagged to the required design tension in compliance with the NESC. The process is repeated until the OPGW and conductors are pulled through all sheaves. Conductor stringing also requires access to each structure for securing the conductor to the insulators, OHGW, or OPGW to each structure, once final line sag is established.

For public safety and property protection, temporary wooden guard structures would be used to provide temporary support when stringing conductors, OHGW, and OPGW across existing power lines, roads, highways, railroads, and other linear obstacles. The structures would be removed when stringing is complete; the guard structure holes would be backfilled and the sites would be reclaimed. All temporary wooden guard structures would be installed within the transmission line ROW. Pipeline crossings would be identified on construction plans and would visibly marked in the field. Matting would be installed across pipeline ROWs as necessary to allow equipment to safely cross these areas. Following construction, matting would be removed and the area restored. All utilities would be located and marked through the North Dakota One Call service. Additional measures that would be implemented for the project for public health and safety are discussed in Appendix A of this document.

Structure Site Access and Traffic

Construction crews would gain access to the ROW from public roads and section line trails, as well as within the transmission ROW itself in areas with no public access. Access for line construction would be by truck within the ROW. Structures located along section lines would be accessed from section line roads and trails where possible. These construction access trails would be temporary, two-track limited maintenance passageways requiring minimal, if any, leveling, temporary culverts, or other improvements to access structure locations. The exception would be on the LMNG where permission would need to be obtained from USFS to access any trails or roads that exist along section lines. New surface access roads are not anticipated for a majority of the line; however, they may be required in certain areas with no access. Access in areas with steep or rugged terrain, particularly near the Little Missouri River and associated tributaries would likely be gained using helicopters and would not require additional new roads. Existing construction access trails would be rehabilitated after construction to comparable or better conditions than they were prior to construction activities. New construction access trails would be restored to the natural condition of the surrounding area (see Appendix A of this document). Gates installed to facilitate access and keep livestock from roaming on-site during the construction process would be left in place, with landowner concurrence, following construction of the line. Fences and gates removed during the construction process would be replaced or rebuilt following completion of construction.

Temporary overland access would be used in areas not accessible by local roadways or section line trails with the exception of the LMNG. If possible, access through cultivated fields would be done during the non-growing season. If crop damage occurs, landowners would be compensated for loss of crops.

Temporary overland access routes would result in temporary disturbance and compaction of soil and vegetation. Vegetation along these routes would recover quickly, as no grading would be required. Landowners would be compensated for temporary overland access routes.

Substation/Switchyard Construction Procedures

Construction procedures for all the new 345/230-kV and 345/115-kV substations and 345-kV switchyards would be essentially the same, except for the specific equipment installed. Each site would be approximately 12 acres, except for the Blue Substation which would actually be two adjacent substations (345/230-kV and 345/115-kV), requiring 25 acres. Additional land around each substation/switchyard would be acquired for buffer with adjacent lands and to provide space for transmission line connections. Following survey and staking of the site, erosion control best management practices (BMPs) would be followed. Site access would be developed, including installation of culverts in adjacent road drainage ditches for installation of a gravel driveway. No clearing of forested areas is anticipated for any of the substation/switchyard locations. The site would be graded and fenced. Concrete pads and footings for equipment would be installed. Aggregate would be spread throughout the fenced area. Equipment would be delivered to the site and generally stored inside the fenced area, although some materials may need to be stored on the property outside the fence due to size or safety considerations. Equipment such as circuit breakers, bus work, capacitors, and dead-ends would be assembled and installed. Transformers, where required, would be delivered to the site and installed. Substation/switchyard control house and supervisory control and data acquisition equipment would be installed. Upon completion of construction activities, disturbed areas outside the fence would be restored and erosion control measures removed.

Construction Schedule and Projected Workforce

Although construction would occur over 2 years, individual crews may be required for only a few months in a particular construction area before moving out to another area on a subsequent phase of the project. Additionally, construction would not be confined to one area or community, but workers would be spread out over 278 miles in four crews of approximately 50 workers each, for a total of 200 workers.

Right-of-way and Property Issues

Basin Electric's Lands and Right-of-Way Division is responsible for acquiring easements for the project. Due to the tremendous increase in development across this region, Basin Electric has been obtaining easements where possible prior to approval of the final route. During the easement process, landowners are contacted to request permission for property boundary, biological, terrain mapping, and archeological surveys. The survey permit form is not an easement and not all properties would require all types of surveys.

During the easement process, Basin Electric staff provides landowners ample time to review and comment on the easement location. Landowners are compensated for the easement and any damages to existing crops or other property features, potential future years of agricultural impacts from the transmission ROW, and transmission structures on the property.

2.5 TRANSMISSION LINE MAINTENANCE AND OPERATION

Continued access to the transmission line ROW would be needed following construction to conduct periodic inspections, perform routine maintenance, and repair any damage to the transmission line or structures. Maintenance activities would be limited to the ROW where possible, and would be in accordance with all local, state, and federal regulations and permits. Landowners would be compensated for any damages occurring during routine maintenance, inspections, or repairs.

Substations would be subject to regular inspections to ensure equipment is in good working order and the area is neat and tidy. Faulty or worn equipment would be repaired or replaced. Trash would be collected and properly disposed of off-site. Fluid levels in transformers would be monitored remotely by system operators and would be regularly checked and transformers would be inspected for leaks. Batteries for emergency back-up operations would be inspected, fluid levels checked, and replaced as necessary. In the event of system disturbances, equipment would be inspected and reset as necessary. Any potential security concerns such as damage to the fence, exterior lighting, or locks would be addressed. The control house would be kept clean and in good structural and visual condition. All maintenance and operations activities would occur within the fenced area of the substation.

2.6 PROCEDURES FOR MINIMIZING ENVIRONMENTAL IMPACT DURING CONSTRUCTION

Numerous BMPs and mitigation measures have been incorporated into the development and construction of the proposed project to protect environmental and human resources. These measures are varied and may be intended to address specific resource concerns, be more general in nature, or address multiple areas of concern for different resources. Minimizing measures range from avoiding sensitive resources during project and route development to conditions for restoring the project ROW following construction. BMPs that have been identified to date and would be implemented as part of the project are discussed in Appendix A of this document. Other mitigation measures would be evaluated and considered throughout the evaluation process.

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3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.1 AESTHETICS AND VISUAL RESOURCES

3.1.1 Affected Environment

The complete affected environment text for Aesthetics and Visual Resources can be found in the DEIS in Section 3.1.1, Affected Environment, on pages 3-3 through 3-10.

3.1.2 Direct and Indirect Effects

This visual impacts assessment focuses primarily on sensitive viewpoints that fall within the viewshed of the proposed project facilities, and secondarily, on the general visual impacts of the project on the visual character of the project area. Visual impact assessments consider the current visual character of the area, the intrusive effect that project actions may have on that visual character, and the ability of certain areas to absorb the changes in scenery without altering the visual character of the area. The level of visual intrusion created by the project facilities will be described with respect to the different distance zones, types of observers, and observation points. Additionally, thresholds are used to assess the level of impacts each alternative would have on visual resources. The context and intensity definitions established for this project are described in Table 3-1 of the DEIS on page 3-11.

Potential Viewers and Sensitivities

Many factors influence the visual impact of any project. It is important to consider the viewer, including their expectations, activities, and frequency of viewing the line. Three types of viewers have been identified within the project area. These include local residents, employees, and recreational users. These three groups are discussed in more detail below.

<u>Local Residents</u>

Local residents are people who live in the project area of the proposed transmission line. Most residents within the project area live on rural farmsteads with large viewsheds and may view the line from their yards or homes, while driving on local roads, or during other activities in their daily lives. The sensitivity of local residents to the visual impact of the line may be mitigated by exposure to existing transmission lines and other dissonant features already within the viewshed. Local residents can be highly sensitive to changes in the landscape that can be viewed from their homes and neighborhoods.

<u>Employees</u>

Employees, the majority of whom work in the project area, primarily in the oil and gas or agricultural industry, would experience the line as they commute and potentially from their place of employment. Because many employees in the area live in temporary housing near oil or gas wells, they are likely surrounded by industrial influences. As a result, employees are not anticipated to have high sensitivity to a new transmission line near their place of work.

<u>Recreational and Traditional Users</u>

Recreational users include local residents and tourists involved in recreational activities at North Dakota Badlands, TRNP, LMNG, Lewis and Clark State Park and Little Missouri State Park, scenic by-ways, historic and cultural sites, and natural areas. Scenery and visual quality may or may not be an important recreational experience for these viewers. For some recreational users, scenery is an important part of their experience because their activities require attentiveness to views of the landscape for long periods of time. Such viewers also may have a high appreciation for visual quality and high sensitivity to visual change. However, changes to the visual landscape would only be recognized by repeat visitors to the area. For traditional users, such as Native American tribes and groups with an ethnographic affiliation to the areas of potential visual change, the preservation of aesthetic aspects of the landscape quality may be of critical importance. Consultation with these traditional users is ongoing. The consultation process, including a list of tribes contacted, is presented in Chapter 7 of the DEIS.

Scenic Integrity and Visual Absorption

Scenic integrity is the degree to which the character of a landscape does not deviate from the natural, natural-appearing landscape in terms of line, form, color, and texture of the landscape. In general, natural and natural-appearing landscapes have the greatest scenic integrity. As artificial incongruities are added to the landscape, the scenic integrity diminishes.

Some landscapes have a greater ability to absorb alterations with limited reduction in scenic integrity. The landscape character and complexity, as well as environmental factors, influence the ability of a landscape to absorb changes in landscape. A new transmission line next to an existing line provides less contrast, and therefore can be absorbed into that landscape more readily than if a transmission line is introduced as a new feature into an undeveloped area.

No-action Alternative

Under the no-action alternative, the project would not be constructed. The existing environment within the project area would remain the same, and no land would be used for transmission lines, facilities, or substations. Because no construction would occur, there would be no impacts on the visual resources or aesthetics in the area. However, if the project is not developed, there may be other development that occurs that may include using small gas-fired turbines or diesel generators at individual well sites that could cause additional visual impacts.

Alternative C

Under Alternative C the transmission line would be built. As described in Chapter 2, several tower types would be required for the construction of this alternative. Table 3-1 below shows the different structure types and the associated structure height. Diagrams illustrating the visual appearance of these towers are provided in Chapter 2, Figures 2-4 to 2-9.

Table 3-1: Tower Structure Types and Heights

Description of Design Component	345kV	230/115kV	345/115kV	230kV	345kV (H-Frame)	345/345
Minimum and maximum structure height (feet)	100-130	97-127	115-145	70-110	80-100	100-155
Average height of structures (feet)	115	112	130	95	90	130

Construction and operation of the transmission line would result in the introduction of an additional constructed feature into the visual landscape and would change the existing viewshed throughout the project area. Potential visual impacts to individuals or resources as a result of the proposed project could include the following:

- Changes to the viewshed from residences and residential areas as a result of the introduction and proximity of the transmission line and/or structures
- Changes to the visual landscape with respect to the Little Missouri River, a state-designated scenic river
- Changes to the landscape in traditional use areas
- Changes to the visual landscape near state historic sites
- Changes to the visual landscape within or near recreational areas and historical sites such as state and national parks, including the LMNG, TRNP, the North Dakota Badlands, Lewis and Clark State Park, Little Missouri State Park, and the proposed Killdeer Mountain Battlefield site
- Reduction in the visual quality of scenic byways or trails crossed or paralleled by the proposed project

Alternative C includes clearing a 150-foot ROW to construct a new transmission line, associated structures and conductors. Based on the visual integrity objectives identified in the Northern Great Plains Management Plans Revision (USFS, 2001), the majority of the LMNG tracts within the project area have a low scenic integrity objective (SIO). As a result, with the exception of small areas around the TRNP-North Unit, most of the project area would coincide with SIO on federal lands. A low SIO is described as a landscape appearing heavily fragmented, with human activities strongly dominating the natural landscape. However, there are some less developed areas with a low-moderate SIO within the same affected management areas on the LMNG. The majority of private lands within the project area are heavily developed for oil and gas or are used for agricultural purposes, also resulting in low scenic integrity. The proposed project would be consistent with the definition of a low (or low-moderate) SIO and would not likely contribute to adverse changes to the existing visual setting throughout the majority of the project area because the transmission line would be located within an already visually-altered setting, characterized by development and existing infrastructure.

Alternative C would comprise multiple route segments, for a total length of approximately 278 miles and would be constructed through varying types of terrain. Distance from the line, terrain, topographical features in the area, differences in elevation, artificial features, and natural features such as forest cover would all influence the level of potential visual impact at specific locations throughout the project area.

Overall, Alternative C would include approximately 130 road crossings along the length of the route and would introduce a new visual element to the surrounding area for motorists and local landowners at each of these road crossings. However, many of these roads are county section-line gravel roads that receive only very minimal local traffic. The addition of a transmission line would be more noticeable to viewers located at road crossings of larger, well-traveled roads, and the features of the transmission line would be particularly noticeable where no existing transmission lines are currently within view of the road.

The transmission line would be most noticeable for motorists travelling along U.S. Highway 85, where uninterrupted views of the line would be readily available. Average daily traffic volume in 2012 along U.S. Highway 85 between the junction with Highway 200 south of Grassy Butte and the junction with Highway 23 in Watford City was between 4,800 and 9,965 (North Dakota Department of Transportation, 2013). It is therefore probable that an estimated 7,383 daily observers travelling in vehicles at an average speed of 65 miles per hour along the roughly 70-mile length of Highway 85 where the transmission line would be present would be able to periodically see the line for approximately 1 hour and 5 minutes. This would vary, however, based on the topography adjacent to the road, which would block views of the line for long stretches of the route, as well as the inability of observers to see the line when the transmission ROW would depart from the roadway. Travelers would be able see the transmission line along the road and potentially take note of its visual contrast with the surrounding landscape.

Alternative C would be located within 500 feet of six residences, two of which are located at points where the route would cross the Missouri River (see Visual Simulations 1 and 4 in Appendix C of the DEIS, which depict views from the Missouri River facing north and southeast, respectively). Although the precise placement of the transmission line within the proposed corridor is not known at this time, homes in the area of the Missouri River crossing may experience elevated concerns related to visual impacts. However, throughout the majority of the project area, including at the Missouri River crossing, visual changes around residences would be minimal because the transmission line would be located along existing transmission lines, roads, or in areas that contain other constructed visual elements such as oil and gas facilities or communications towers. Additionally, to minimize visual contrast at the Little Missouri River crossing, structures placed at this river crossing location would be constructed of weathering steel to present a reduced visual contrast to the surrounding landscape compared to galvanized steel construction. Minimum set-back requirements from residences would further mitigate visual impacts. These requirements would be followed during site-specific planning, engineering, and construction phases of the project.

Potential impacts pertaining to aesthetic and visual resources associated with the placement of the transmission line along each segment of Alternative C are described in greater detail in the following discussion.

Beginning Segments

Alternative C begins at the AVS Substation in Mercer County and runs directly west, roughly paralleling a carbon dioxide (CO_2) gas line located 1.5 miles to the south. The landscape in this area has dispersed rural and agricultural development, with rolling to flat topography and little intervening vegetation. After approximately 45 miles, Alternative C diverges into two segments at the Red Switchyard, located near Killdeer. While one segment of Alternative C (Red Switchyard to Charlie Creek Substation to Blue Substation) continues west, the other segment (Red Switchyard to White Substation to Blue Substation) turns north, continuing to roughly parallel the CO_2 gas transmission pipeline. The two segments then converge north of Arnegard, North Dakota.

Western Segment

The western segment of Alternative C crosses the Killdeer Mountain Four Bears Scenic Byway (ND State Highway 22), a state-designated scenic byway, north of the town of Killdeer in western Dunn County near service facilities (gas stations, convenience stores, restaurants) and other human influences. This crossing occurs adjacent to a large oil well, and other constructed features, including a recently constructed 115-kV transmission line (directly parallel to the byway), oil and gas development, rural farmsteads, and communications structures. Topography and the winding nature of portions of the highway would limit views of the line to generally short sections where motorists would only have momentary views of the line. The proposed route would not be anticipated to adversely change the scenic designation of ND State Highway 22 or the overall scenic integrity along the roadway.

After crossing ND State Highway 22, the western segment of Alternative C shifts slightly south to generally parallel an existing 115-kV transmission line on the north side of North 3rd Street, before turning south and west into the Charlie Creek Substation. Alternative C then continues predominantly northward to Williston paralleling U.S. Highway 85. A large portion of the area along U.S. Highway 85 is part of LMNG. The route would be highly visible to drivers along U.S. Highway 85 and would introduce a new artificial feature through portions of the USFS-controlled LMNG in McKenzie County and would be visible to residents and other observers located within the primarily agricultural lands east of the highway. However, as previously noted, most of these areas are classified as having a low SIO and, while the route would visually change the existing viewshed for area users and motorists traveling on U.S. Highway 85 as it passes through or near the grassland areas, the scenic integrity of these areas would not be adversely affected by the introduction of a new artificial feature. The portion of the western segment of Alternative C along U.S. Highway 85 through the badland areas associated with the Little Missouri River would potentially contribute to visual impacts. Certain vantage points along U.S. Highway 85 offer commanding views of the area that would be interrupted by the presence of a utility line. However, the presence of an existing transmission line parallel to U.S. Highway 85 already presents some degree of visual contrast. Further, the Land and Resource Management Plan for the Dakota Prairie Grasslands encourages co-location of roads and utility corridors to mitigate adverse visual effects on the natural landscape and contain infrastructure and associated facilities to an existing corridor rather than allowing disturbances to be scattered across the LMNG.

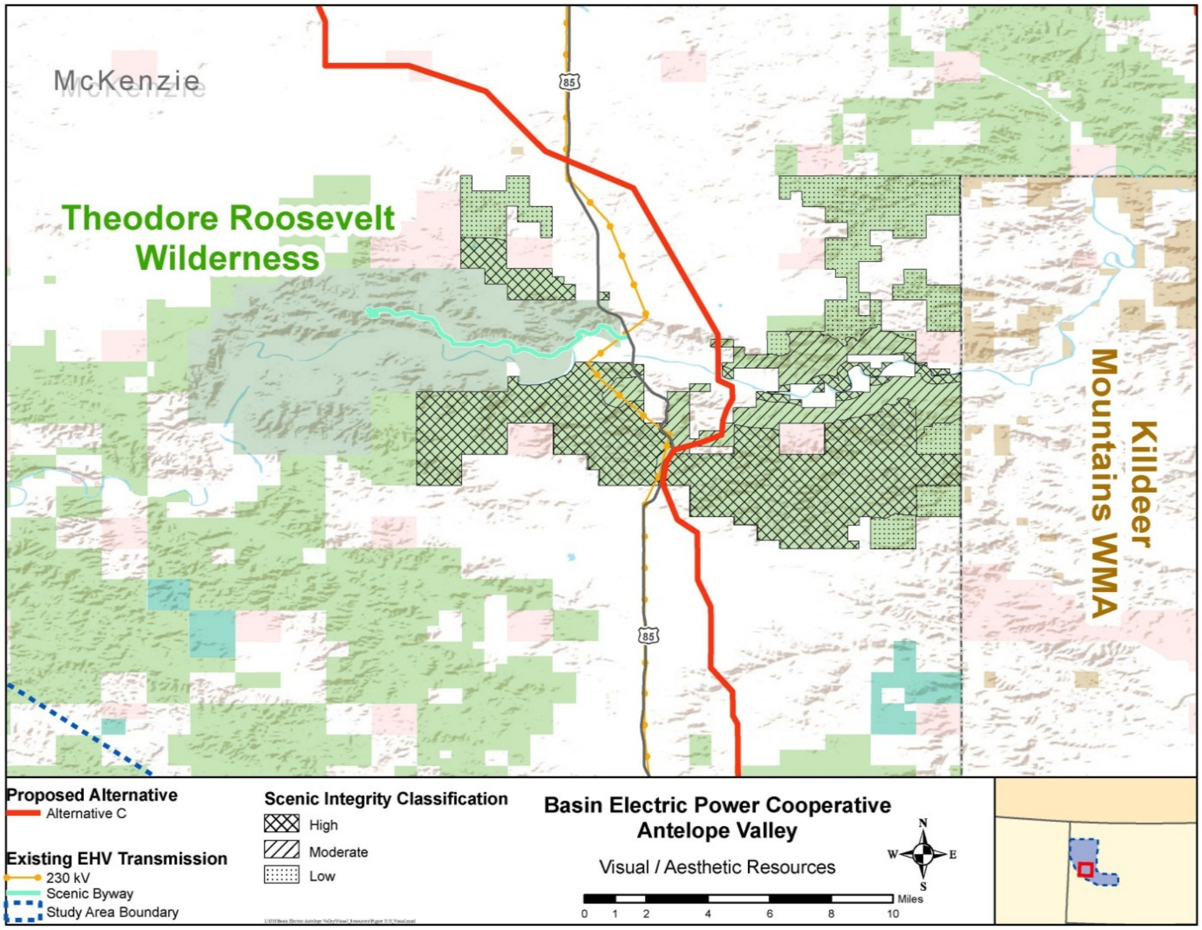
The western segment of Alternative C would pass within 3.8 miles of Lone Butte (see Visual Simulation 2 in Appendix C of the DEIS, which depicts views to the west of Lone Butte). The route would not pass through the Lone Butte Management Area (designated by the USFS as Roadless). However, the transmission line would be visible from points within the Lone Butte Management Area. These southwestern facing views of the project from Lone Butte (at a 2,749 feet elevation) would also include the agricultural lands, roadways, other infrastructure, and other generally low intensity development within which the transmission line would be situated. As a result, the project would not present a comparably greater contrast to the existing setting as seen from this Roadless area. The topography of the landscape west of Lone Butte includes numerous ridges ranging from 2,400 to 2,600 feet in elevation. The transmission line would not be visible in the foreground or middle ground to the west and northwest of vantage points near Lone Butte. Only very distant views of the corridor would be noticeable from this vantage point.

An existing 230-kV transmission line, several communications towers, rural residences, and oil development facilities are currently visible along U.S. Highway 85 from the Lone Butte Management Area (see Visual Simulation 2 in Appendix C of the DEIS). As can be seen in the visual simulation prepared for this location, the visibility of the transmission line would be considerably limited due to the distance, topography, and vegetation in this area.

There are more than 28,500 acres of lands in the LMNG that are classified by USFS as having a moderate or high SIO. Lands classified as having moderate scenic integrity east of U.S.

Highway 85 are illustrated in Figure 3-1. Portions of the transmission line would cross through these lands.

Figure 3-1: Proximity of Proposed Route to Areas with Scenic Integrity on U.S. Forest Service Lands



SIO levels of moderate scenic integrity do allow for some level of human intrusion. This level refers to landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed (USFS, 2013). In portions of the project area where the proposed transmission line transects areas with moderate scenic integrity levels, special mitigation strategies would be employed to reduce impacts on visual and aesthetic resources. These strategies could include the following:

- Camouflage—Employing the application of natural colors and patterns of color from the surrounding landscape or visible background that may conceal the structures or reduce their visual effect. The use of weathering steel structures can provide this feature depending on the viewpoint of the observer. The use of camouflage is ideal in situations where the feature would not be skylined from key vantage points, in which case retaining the normal color of poles or structures is preferred.

- Maintenance/Decommissioning—Maintaining the structures to reduce visual impacts resulting from neglect over the duration of their useful life, and removing objects from the landscape once they have been deemed obsolete.
- Offsets—Correcting an existing aesthetic problem identified within the viewshed of a proposed project may qualify as an offset or compensation for project impacts. A decline in the landscape quality associated with a proposed project can, at least partially, be offset by the correction. In some circumstances a net improvement may be realized.

The western segment of Alternative C would also pass approximately 1.5 miles east of TRNP and the TRNP-North Unit Scenic Byway, and would cross the state-designated scenic Little Missouri River. TRNP is a federal Class I Area airshed, which is a sensitive area that has been designated as requiring protection from air pollutants that can cause visibility impairment within the airshed, such as those found in vehicle emissions and fugitive dust. Although the western segment of Alternative C would pass close to TRNP, any air impacts resulting in reduced visibility would be limited to the short duration of construction near the park. Air emissions would be controlled as much as is practicable during construction phases through the incorporation of BMPs such as the use of water to suppress fugitive dust during ground disturbance and excavation activities. A transmission line already exists across the eastern edge of TRNP, the TRNP-North Unit Scenic Byway, and the Little Missouri River just west of U.S. Highway 85, so an additional transmission line to the east of this area (and not in the park) may not appear as intrusive as it might otherwise if a line was not already present. Many portions of the TRNP viewshed are experiencing constructed visual intrusions to the natural landscape such as oil and gas pumps, wells, and drill rigs. Television and radio communication towers are also visible. As illustrated in Visual Simulation 3 (Appendix C of the DEIS), which depicts views east of TRNP, the western segment of Alternative C would result in only minimal new visual contrast being introduced into the landscape. The distance of the line from the boundaries of TRNP, as well as the existing topography, vegetation, and human features in the landscape, all contribute to minimize any additional visual contrast resulting from the placement of the transmission line into the existing landscape.

The western segment of Alternative C heads north from the Little Missouri River, crossing over U.S. Highway 85 two more times before meeting the eastern segment of the route, north of Arnegard. Alternative C would cross the Missouri River adjacent to U.S. Highway 85 in an area with wide, flat, and generally open views on the south side of the river, giving way to a steep bluff on the north side. No designated scenic resources occur in this area. Numerous residences have been constructed along the ridge north of the river, most oriented to provide a wide view of the river valley below. The current viewshed provides impeded views of the river, adjacent woodlands, and natural topographic features to the south. The setting also includes a view of U.S. Highway 85 and an existing transmission line adjacent to the highway. Oil and gas facilities are also visible within the river valley and adjacent areas above the valley to the north and south. This is illustrated in Visual Simulations 1 and 4 in Appendix C of the DEIS, which depict views from the Missouri River facing north and southeast, respectively. Construction of the proposed project would introduce a new artificial element to the viewshed. However, the additional visual element would not be unlike those already present in the landscape, and it would be located near these existing features. The visual contrast from these features would be less noticeable on the landscape from higher elevation vantage points where the features are not skylined as shown in these visual simulations. Consequently, adverse impacts on the visual setting of this area are not anticipated.

Eastern Segment

The eastern segment of Alternative C would cross the Killdeer Mountain Four Bears Scenic Byway in an area where a 115-kV transmission line and the CO_2 pipeline are directly parallel to the road and also through a North Dakota state lands parcel. The crossing of the scenic byway along the eastern segment occurs amid a setting characterized by constructed elements along open grassland and croplands that do not offer increased scenic value along the byway in these areas (see Visual Simulations 5 and 6 in Appendix C of the DEIS, which depict the views to the north and northeast from ND State Highway 22). The eastern segment of Alternative C continues to parallel the road approximately 0.5 mile west of the scenic byway; however, there is an existing 115-kV line between the road and the proposed route, which would cause viewers to have to look through an existing transmission line to notice any transmission line that was constructed as part of Alternative C. Topography and the twisting nature of portions of the highway also limit views of the line to generally short sections where motorists would only have momentary opportunities to see the line. In areas adjacent to or near the crossing, the line may be visible to motorists for slightly longer periods of time while on the byway.

Continuing north, the eastern segment of Alternative C enters the scenic area of the North Dakota Badlands and the Little Missouri River. Alternative C would cross the Little Missouri River west of the Killdeer Mountain Four Bears Scenic Byway. This crossing area contains considerable badlands topography, vegetation and river valley features, and opportunities for wide picturesque viewsheds. This area is not part of LMNG, and therefore has not been assigned an SIO. Additionally, the area is located in a remote setting and therefore limits opportunities for both development and viewing by visitors. The general location for the eastern segment of Alternative C to cross the Little Missouri River, which is a state-designated scenic resource, is in the corridor of an existing CO_2 pipeline and 0.8 mile west of a 115-kV transmission line. This corridor currently contains constructed visual elements and access for construction and maintenance. While the presence of the transmission line may change the viewshed of this area, any changes would be localized by co-locating in an existing utility corridor, thereby preserving the natural and relatively undisturbed viewsheds throughout other sections of the Little Missouri River Valley. The co-location of similar visual disturbances would result in less of an adverse impact than if those disturbances were distributed throughout the landscape. However, the placement of an additional transmission line into the landscape, even if co-located with an existing line, would result in an incremental increase in visual disturbance when compared with the existing conditions. This is particularly true given that the additional structural component could be located as much as a mile from the existing transmission line.

The eastern segment of Alternative C continues to parallel the CO_2 gas pipeline for approximately 8.5 miles after the river crossing and passes within 0.1 mile of several tracts of LMNG in McKenzie County. As these areas are classified as having low scenic integrity, no adverse concerns for the visual landscape of these areas is expected. At this location, the route lies approximately 6 miles southwest of the Blue Buttes traditional area in the LMNG located north of ND State Highways 23 and 73. The nearest high use area of Blue Buttes would be approximately 10 miles northeast of the Alternative C corridor. As a result, the transmission line would result in minimal visual effects to the Blue Buttes traditional use area. The route then diverts northwest from the gas line, traversing across open country and not parallel to any other existing linear features. The route interconnects with the White Substation east of Watford City before it is directed northwest to the Blue Substation. The topography through this area is indicative of the scenic badlands of the area. As mentioned previously, there are currently few roads through this area, thus limiting access to view these vistas and the proposed project. The current oil and gas development is resulting in additional roadways to service the new well locations.

<u>Final Segments</u>

After the eastern and western segments of Alternative C converge north of Arnegard, at the Blue Substation, the route continues until its terminus at the Neset 345-kV Substation, crossing the Lewis and Clark National Historic Trail and an auto tour route along this section. The Lewis and Clark National Historic Trail itself follows the Missouri River. Alternative C would cross the trail at its crossing of the Missouri River near Williston adjacent to an existing transmission line and U.S. Highway 85. Thus, views from or of the Lewis and Clark National Trail in this area are not expected to be significantly altered following construction of a transmission line. Although the entire trail is not itself scenic, the auto tour route provides motorists with an opportunity to view some of the more scenic areas in the general vicinity of the trail. Alternative C would cross the auto tour route three times between the AVS and Judson substations. The crossings would include the Killdeer Mountain Four Bears Scenic Byway, U.S. Highway 85 west of Watford City, and U.S. Highway 2 west of Williston. All of these crossings would occur in primarily rural areas where constructed features such as oil wells and existing transmission and distribution lines are present. Agricultural uses are also present in these areas but represent primarily grazing lands or croplands with little scenic value.

While Alternative C would cross the Little Missouri River in areas paralleling major thoroughfares (ND State Highway 22 and U.S Highway 85), new access trails may also be required in certain areas near the Little Missouri River and associated tributaries with no access and steep, rugged terrain. Given the relatively undeveloped character of these areas, it is likely that visual impacts associated with the construction of any new access trails for this alternative would have a low to moderate, temporary impact on visual resources. Short-term visual impacts would be expected to occur due to the presence of heavy machinery, equipment, and material staging during construction. However, because many of these areas are remote, they would not be visible to a large number of individuals traveling or recreating in the area. In addition, any new trails would be reclaimed after construction and would thus have only a temporary visual impact. They would be relatively unnoticed by visitors to the area and would meld back into the environment following cessation of construction activities.

Overall, due to the human influence and existing infrastructure in the area (in the form of transmission and distribution lines, oil and gas development, agricultural operations, and gas pipelines) and the distance from federally recognized visually sensitive areas and parks, it is likely that the construction of the transmission line under Alternative C would have short-term, low adverse impacts during construction and long-term, low to moderate adverse impacts on aesthetics and visual resources during the lifetime of the project.

Alternative D

Visual impacts associated with the construction and operation of Alternative D would be similar to those of Alternative C. Alternative D follows the same path as Alternative C with the exception that the Charlie Creek to Blue Substation line would not be required. The most notable visual difference between the two alternatives is that Alternative D comprises a double circuit along approximately 63 miles of the alignment between the Red Switchyard and Blue Substation, described for the eastern segment of Alternative C, and would not include the visual impacts associated with the western segment of Alternative C along Highway 85. A description of structure types and tower heights required for the construction of Alternative D are provided in Chapter 2 (Figures 2-4 through 2-9). This double-circuit 345/345-kV arrangement would require taller structure and have twice the amount of conductor present, which would present a larger visual impact to the observer than Alternative C.

Alternative D would be located within 500 feet of five residences, two of which are located at points where the route would cross the Missouri River, and would have 100 road crossings along the length of the route. Like Alternative C, a majority of these roads are county section-line gravel roads with very light traffic, likely only from the local residents. As described for the eastern segment of Alternative C, Alternative D would cross the Killdeer Mountain Four Bears Scenic Byway near constructed features including an existing transmission line, oil and gas development, rural farmsteads, and distribution lines. These artificial elements along open grassland and cropland surrounding the crossings would not diminish existing scenic value along the byway in these areas (see Visual Simulations 5 and 6 in Appendix C of the DEIS for northern crossing of byway). Alternative D would continue to parallel the road approximately 0.5 mile west of the scenic byway; however, there is an existing 115-kV line between the road and the proposed route, causing viewers to have to look through an existing transmission line in order to see the Alternative D transmission line. Topography and the twisting nature of portions of the highway also limit views of the line to generally short sections where motorists would only have momentary views of the line. In areas adjacent to or near the crossing, the line may be visible to motorists for slightly longer periods of time while on the byway.

Continuing north, Alternative D would enter the scenic area of the North Dakota Badlands and the Little Missouri River, which is designated by the state as a scenic resource. Alternative D would cross the Little Missouri River west of the Killdeer Mountain Four Bears Scenic Byway. This crossing contains considerable badlands topography, vegetation, and river valley features, and opportunities for wide picturesque viewsheds. This area is not part of the LMNG and has not been assigned a SIO. Additionally, the area is located in a remote setting that limits development and visitor access, resulting in very few opportunities for public viewing. The general location for Alternative D to cross the Little Missouri River is in the corridor of an existing CO_2 pipeline and 0.8 mile west of a 115-kV transmission line. This corridor currently contains constructed visual elements and access for construction and maintenance. While Alternative D may change the viewshed of this area, any changes would be minimal and localized by the fact that it would be co-located with other utilities in an existing utility corridor. This would preserve the natural and relatively undisturbed viewsheds that occur in adjacent sections of the Little Missouri River Valley. The co-location of similar visual disturbances would result in less of an adverse impact than if those disturbances were distributed throughout the landscape. However, the placement of an additional transmission line into the landscape, even if co-located with an existing line, would result in an incremental increase in visual disturbance when compared with the existing conditions. This is particularly true given that the additional structural component could be located as much as a mile from an already existing transmission line.

Alternative D would parallel the CO_2 gas pipeline for approximately 8.5 miles after the river crossing and pass within 0.1 mile of several tracts of the LMNG in McKenzie County. Because these areas are classified as having low scenic integrity, no adverse impacts would be anticipated from construction of a transmission line. Alternative D would then divert northwest from the gas line going cross-country and not parallel to any existing linear features. The topography through this area is indicative of the scenic badlands of the area. However, as previously described, lack of public access and development constrain any opportunities to view these vistas.

Continuing west, Alternative D crosses the Lewis and Clark National Historic Trail, the auto tour route, and the Missouri River at the same locations as Alternative C. These crossings would occur in primarily rural areas where constructed features such as oil wells and existing transmission and distribution lines are present. Agricultural uses are also present in these areas but represent primarily grazing lands or croplands with little scenic value.

North of the Missouri River, the visual character of the landscape and topography is dominated mainly by crop-based agricultural land uses heavily interspersed with oil and gas production operations. The northern part of the project area is heavily influenced by human activity and contains two existing transmission lines. Depending on the exact placement of the transmission line within the landscape, the introduction of a new transmission line may impact the scenic value of the landscape. However, given the intensity of existing development in this area, impacts would be minor in level of severity and represent only incremental changes to existing conditions.

While Alternative D would cross the Little Missouri River in an area paralleling a major thoroughfare (ND State Highway 22), new access trails may also be required in certain areas near the Little Missouri River and associated tributaries with no access and steep, rugged terrain. Given the relatively undeveloped character of these areas, it is likely that the visual impacts associated with the construction of any new construction access trails for this alternative would have a low to moderate, temporary impact on visual resources. Short-term visual impacts would be expected to occur due to the presence of heavy machinery, equipment, and material staging during construction. However, because many of these areas are remote, they would not be visible to a large number of individuals traveling or recreating in the area. In addition, any new trails would be reclaimed after construction and would thus have only a temporary visual impact. They would be relatively unnoticed by visitors to the area and would meld back into the environment following cessation of construction activities.

Overall, due to the presence of human influence and existing infrastructure in the area (in the form of transmission and distribution lines, oil and gas development, agricultural operations, and gas pipelines) and the distance from federally recognized visually sensitive areas and parks, it is likely that the construction of the transmission line under Alternative D would have short-term, low adverse impacts during construction, and long-term, low to moderate adverse impacts on aesthetics and visual resources during the lifetime of the project.

Alternative E

Impacts to aesthetics and visual resources occurring under Alternative E would be similar to those described for Alternative D because the alignment of the two alternatives would occupy the same space on the landscape. However, although Alternative E would require shorter, single-circuit structures, it would include construction of an additional 345-kV line north of Killdeer for 61 miles between the Blue Substation and the Red Switchyard, resulting in two parallel lines located within a 300-foot ROW (total length of 126 miles of line). Alternative E would be located within 500 feet of six residences, two of which are located at points where the route would cross the Missouri River.

Due to the incremental contribution to visual contrast on the landscape resulting from this additional component, Alternative E would be more visually intrusive than Alternatives D and C. Observers would be able to more readily view the modification to the landscape along this segment of the transmission corridor, which would be wider than under Alternative D and represent a higher degree of visible intrusion into the existing character of the landscape. Thus, the construction of the transmission line under Alternative E would have short-term, low-intensity adverse impacts during construction and long-term, moderate adverse impacts on aesthetics and visual resources during the lifetime of the project.

Similar to Alternatives C and D, impacts from this alternative would be minimized by the presence of human influence and existing infrastructure throughout the area (in the form of transmission and distribution lines, oil and gas development, agricultural operations, and gas pipelines), use of weathering steel structures in areas of higher visual sensitivity, and the distance from federally recognized visually sensitive areas and parks.

3.2 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

3.2.1 Affected Environment

The complete affected environment text for Air Quality and Greenhouse Gas Emissions can be found in the DEIS in Section 3.2.1, Affected Environment, on pages 3-23 through 3-28.

3.2.2 Direct and Indirect Effects

This section discusses potential impacts, their duration, and intensity on air quality and greenhouse gases (GHGs) resulting from construction and operation of the proposed project, including the no-action alternative. Definitions for context and intensity are described in Table 3-4 of the DEIS on page 3-28.

No-action Alternative

Under the no-action alternative, the proposed project would not be constructed, and current air quality conditions would remain. There would be no impacts on air quality or any contribution to GHGs as a result of this alternative. However, impacts could occur if no additional transmission capacity is developed in the region and small gas-fired turbines or diesel generators are used at individual well sites.

Alternative C

Under Alternative C, impacts on air quality would occur as a result of the construction and operation of the transmission line and substations. Potential impacts on air quality as a result of construction include increases in fugitive dust caused by construction activity, vehicles, and equipment, and emissions from construction vehicles and equipment. The primary construction impact on air quality comes from fugitive dust. The footprint of the proposed project occurs primarily on open ranges, undeveloped, or agricultural land with transportation occurring primarily on dirt or gravel roads. Increases in traffic on these roads from construction-related workers, equipment, earthmoving activities, and wind action on disturbed areas would all lead to increases in the production of fugitive dust. Site-preparation for the proposed transmission line and associated substations/switchyards would require earthmoving and grading activities, exposing soils and increasing the potential for wind erosion. In addition, as a result of grading activities the transportation of soil and other construction debris in uncovered trucks could also contribute to fugitive dust. The primary concern over fugitive dust would occur during the warmer, drier months when soils are not frozen and are more prone to dust generation. Impacts from fugitive dust would be expected to be short term and only occur during the construction period. Based on the relatively small size of the affected area and current air quality conditions, it is expected that Alternative C would result in low impacts on air quality.

Other impacts on air quality as a result of construction activities come from emissions from construction vehicles and heavy equipment used in the construction process. Emissions stemming from these vehicles and equipment would emit hydrocarbons, particulate matter, and CO_2. Emissions resulting from the construction activities would be highly localized in the immediate project area and ROW and would be similar to or less than those created as a result of agricultural activities taking place in a majority of the project area. Air emissions as a result of construction are expected to be minimal as these activities are not excessive in nature. Estimated emissions are listed in Table 3-2. Emissions stemming from the construction of this alternative would not reduce air quality in the project area, would not exceed U.S. Environmental Protection Agency (USEPA) *de minimis* thresholds, and would not affect the current attainment status of North Dakota; resulting in short-term, low impacts.

Emissions potentially impacting air quality during operation of the transmission line and substations would only occur as a result of atmospheric interactions with the energized conductors. These minor emissions consist of ozone and nitrogen oxide (NO_x) and occur near the conductor due to the development of a corona. These emissions relative to National Ambient Air Quality Standards would be negligible and not approach current *de minimis* standards, resulting in low impacts on air quality.

Table 3-2: Alternative C: Transmission Line and Substations Construction Emissions Estimates and General Conformity De Minimis Thresholds

Pollutant	Emissions (tons)	Emissions (tons/year)	General Conformity De Minimis Threshold (tons/year)
Nitrogen oxide	9.65	4.83	100
Volatile organic compounds	0.74	0.37	100
$PM_{2.5}$	1.36	0.68	100
Sulphur dioxide	0.31	0.16	100
Carbon monoxide	3.56	1.78	100

Note: $PM_{2.5}$ = particles with a diameter less than or equal to a nominal 2.5 micrometers

A potential area of concern regarding proposed air quality impacts associated with Alternative C is the proximity of the proposed transmission line to the TRNP-North Unit, a federal Class I airshed. The proposed transmission line would be approximately 5 miles from the TRNP. Class I areas are sensitive areas with determined important visual qualities and are protected from air pollutants that can potentially cause visibility impairments. Visibility can be affected by several air pollutants including particles with a diameter less than or equal to a nominal 10 micrometers (PM_{10}), particles with a diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$), sulfates, nitrates, and sulfuric acid mist. Potential pollutants occurring as a result of construction activities with the potential to impact visibility are both particulate matters. However, based on the limited amount of emissions resulting from construction activities, their highly localized short-term nature, and the implementation of management practices to control emissions and fugitive dust, construction emissions would not cause visibility impairments to the Class I area.

GHG emissions resulting from Alternative C were calculated for two types of activities that produce GHG emissions: construction of the transmission line and ongoing annual operations and maintenance for its estimated 50-year-long operational life. GHG emissions associated with construction activities would occur over a period of approximately 2 years. Based on existing data, it was assumed that an average of 200 workers (50 per four crews) located throughout the project area would work on the project daily during peak construction (including access and structure installation) and non-peak construction (including installing and removing BMP measures and staging areas, site preparation and restoration work, and equipment and materials moving). The transportation components of GHG emissions were estimated based on the approximate number of vehicles that would be used during project construction and the approximate distance those vehicles would travel. The number of round trips was conservatively estimated using the following assumptions.

- All workers would travel in separate vehicles to and within the project area each day.

- A maximum number of workers (200) would be required to construct the project.
- The round trip distance in the project area is approximately 100 miles, depending on the exact location of workers within the project area.
- Fuel consumption is based on the average fuel economy for standard pickup trucks of 18 miles per gallon. This is likely an overestimate as more efficient vehicles may be occasionally used. Average helicopter fuel mileage is anticipated to be around 1 mile per gallon.

Fuel consumption and GHG emissions would also result from operation of on-site heavy construction equipment. Heavy construction equipment may include augers, bulldozers, excavators, graders, heavy-duty trucks, and front-end loaders. It is also expected that the majority of heavy construction equipment use would occur during peak construction. Assumptions include a maximum of 50 equipment machines would be in operation during peak construction and 25 equipment machines during off-peak. It was also assumed that the average size of equipment would not exceed 250 horsepower and would operate at maximum power for 8 hours per day, 5 days a week, which is a significant overestimation because equipment commonly operates at idle or reduced power.

The implementation of Alternative C would require the permanent removal of trees and other vegetation as a result of access construction and ROW clearing. Permanent tree removal would reduce the level of solid carbon storage in the area. Tree growth and future carbon sequestration rates are highly variable and dependent on several factors, including, the species and age of the tree, climate, forest density, and soil conditions. In the North Central Region of the United States, the average carbon storage associated with forests is 160,000 pounds per carbon acre (USFS, 1992). As a result of Alternative C, a total of approximately 183.1 acres of forested area would potentially be removed. Assuming each affected acre contains the average carbon content for the North Central Region, the net carbon footprint associated with the removal of forested area would be an estimated 19,278 metric tons of carbon dioxide equivalent (CO_2e). However, NDPSC requires tree replacement on a 3:1 ratio. Assuming a 70 percent survival rate after 5 years, the net CO_2e impact is estimated to be considerably reduced. Given this estimate, the impact of vegetation removal on GHG emissions would be low.

During operation and maintenance of the transmission line it is expected that routine patrols, structures maintenance, and aerial inspections by helicopter would occur once per year and emergency maintenance and natural resource review would occur on average once every 4 years, with all activities estimated to incur 100 miles round trip. Operation and maintenance emissions are estimated for the 50-year life span of the transmission line.

Based on the above assumptions this alternative would result in an estimated total of 27,450 metric tons of CO_2e emissions each year during construction and a total of an estimated 62 metric tons of CO_2e emissions for ongoing operations and maintenance activities over the 50-

year lifespan of the line. To provide context for this level of emissions, the USEPA mandatory reporting threshold for large sources of GHGs is 25,000 metric tons of CO_2e emitted annually (74 Federal Register 56260). This threshold is approximately the amount of CO_2e generated by 4,400 passenger vehicles per year. Comparatively, the emissions during project construction would be equivalent to the emissions generated by about 4,832 passenger vehicles per year. Operation and maintenance activities would translate into CO_2e emissions about equal to that of nine passenger vehicles per year. The construction of Alternative C would conservatively exceed the USEPA mandatory reporting threshold. However, based on the relatively minor operational emissions and the character of the project being a transmission line with associated substation and switchyard facilities, the project does not qualify as a large source of emissions that would require reporting. Overall, the contributions of construction, operation, and maintenance of Alternative C on GHG concentrations would be low.

Alternative D

Because Alternative D is slightly shorter than Alternative C, impacts on air quality as a result of this alternative would be similar, albeit slightly less than those associated with Alternative C. Construction-related emissions and fugitive dust would occur in the immediate area of the proposed route and impacts would be short term, localized, and less than significant. Emission estimates from construction are detailed in Table 3-3. Emissions from operations would be localized and less than significant. This alternative would not cross or be near any Class I airsheds.

Table 3-3: Alternative D: Transmission Line and Substations Construction Emissions Estimates and General Conformity De Minimis Thresholds

Pollutant	Emissions (tons)	Emissions (tons/year)	General Conformity De Minimis Threshold
Nitrogen oxide	9.58	4.79	100
Volatile organic compounds	.73	.37	100
$PM_{2.5}$	.66	.33	100
Sulfur dioxide	.30	.15	100
Carbon monoxide	3.53	1.77	100

Note: $PM_{2.5}$ = particles with a diameter less than or equal to a nominal 2.5 micrometers

The construction assumptions for Alternative C were used to calculate GHG emissions for Alternative D, with the exception of assumptions concerning construction workers—Alternative D assumptions use an average of 150 workers (50 per three crews) located throughout the project area who would work on the project daily during peak construction. Based on these assumptions Alternative D would result in an estimated total of 23,700 metric tons of CO_2e emissions and a total of 50 metric tons of CO_2e emissions for ongoing operations and maintenance activities over the 50-year lifespan of the line. Alternative D would likely impact approximately 119.5 acres of forested area to be removed. Assuming each affected acre contains the average carbon content for the North Central Region, the net carbon footprint associated with the removal of forested area would be an estimated 7,260 metric tons of CO_2e. Given this estimate, the impact of vegetation removal on GHG emissions from Alternative D would be low.

Alternative E

Impacts on air quality as a result of Alternative E would be similar, albeit slightly greater due to the increased length of this alternative, to those presented in Alternative C. Construction-related emissions and fugitive dust would occur in the immediate area of the proposed route and impacts would be short term, localized, and less than significant. Emission estimates from construction are detailed in Table 3-4. Emissions from operations would be localized and less than significant. This alternative would not cross or be near any Class I airsheds.

Table 3-4: Alternative E: Transmission Line and Substations Construction Emissions Estimates and General Conformity De Minimis Thresholds

Pollutant	Emissions (tons)	Emissions (tons/year)	General Conformity De Minimis Threshold
Nitrogen oxide	10.96	5.48	100
Volatile organic compounds	.84	.42	100
$PM_{2.5}$	.77	.39	100
Sulfur dioxide	.35	.17	100
Carbon monoxide	4.09	2.95	100

Note: $PM_{2.5}$ = particles with a diameter less than or equal to a nominal 2.5 micrometers

The construction assumptions for Alternative C were used to calculate GHG emissions for Alternative E, with the exception of the assumptions for construction workers—Alternative E construction assumptions use an average of 150 workers (50 per three crews) located throughout the project area who would work on the project daily during peak construction. Based on these assumptions Alternative E would result in an estimated total of 27,400 metric tons of CO_2e emissions and a total of 50 metric tons of CO_2e emissions for ongoing operations and maintenance activities over the 50-year lifespan of the line. The exact acreage of trees to be removed as a result of this alterative is unknown; however, it is likely that it would result in a loss similar to Alternative C (189.4 acres). Assuming each affected acre contains the average carbon content for the North Central Region, the net carbon footprint associated with the removal of forested area would be an estimated 19,278 metric tons of CO_2e. Given this estimate, the impact of vegetation removal on GHG emissions from Alternative E would be low.

3.3 GEOLOGY AND SOILS

3.3.1 Affected Environment

The complete affected environment text for Geology and Soils can be found in the DEIS in Section 3.3.1, Affected Environment, on pages 3-33 through 3-45.

3.3.2 Direct and Indirect Effects

This section discusses potential impacts on geology and soils and prime farmlands within the region as a direct result of the construction and operation of the project, including the no-action alternative. Definitions for duration and intensity of potential impacts to geology and soils and prime farmlands identified for this project are described in Table 3-9 of the DEIS on page 3-46.

Potential impacts on soils from activities proposed under Alternatives C, D, and E would include soil compaction and rutting leading to accelerated soil erosion and the introduction of noxious weeds on the soil surface. Construction activities such as vegetation clearing, excavating, grading, topsoil segregation, and backfilling may also increase erosion potential by destabilizing the soil surface. Impacts on prime farmlands would occur from the loss of potentially productive prime farmland soil acreage in the project area resulting from the above-described effects.

The area of analysis is composed of the 150-foot wide ROW. Impacts on geology and landforms from construction and operation of alternatives within and adjacent to this corridor are presented here and described in detail.

No-action Alternative

Under the no-action alternative the project would not be constructed. Geologic features and landforms would remain undisturbed. Because no landscape changes would occur as the result of construction, surface geology would be unaffected. The underlying bedrock geology would similarly remain undisturbed given that no ground penetrating activities would occur under this alternative. Soils would remain undisturbed. Because no construction-related changes would occur, soil structure and underlying substrate would remain intact, and the suitability of prime farmland soils for agricultural uses would be unaffected. As a consequence, there would be no impacts on geology and soils resulting from the no-action alternative.

Alternative C

Geology and Landforms

Direct impacts resulting from the construction of Alternative C would consist of the displacement of soil and rock during construction of structure foundations. Borings for structure foundations would extend approximately 25 to 30 feet below the surface and would be approximately 8 feet in diameter, resulting in a typical volume of displaced soil and rock of approximately 1,500 cubic feet per structure location. With approximately 1,625 structures used for the construction of the route, a total of approximately 2.4 million cubic feet of displaced soil and/or rock would be anticipated. This displaced soil and rock would be used for backfilling around structure foundations with excess material removed from the site to locations directed by landowner or disposed of at another location. The use of heavy duty vehicles and earth moving equipment required for structure foundations and structure placement would result in short-term minor impacts on local surface geology as a result of compaction and the potential for localized rill erosion near unimproved roadbeds and on sensitive landscapes. In particular, in badland areas where vegetation is removed within the ROW along steep slopes and rugged terrain, construction-related impacts from erosion would accrue to these landscapes. Alternative C would cross terrain with slopes greater than 10 percent. In areas where steep slopes and highly erodible soils occur, an increased potential for landslides may result from these conditions. These effects are discussed below.

Alternative C would cross approximately 30.6 acres within the ROW where landslides have occurred previously. The potential for landslide occurrence during project implementation is elevated in certain areas along the length of the route, such as in northwestern Dunn County and southeastern McKenzie County. Of particular note, badland areas along the transmission line route, consisting of steep sparsely-vegetated terrain, pose a greater likelihood of landslide occurrences than other, more gently-sloped areas along the route. Landslide events are more likely to occur during heavy precipitation.

Generally, project construction would require little disturbance to surface soil and would neither be large enough nor deep enough to have any type of impacts on geologic formations throughout the project area. Although linear in form and design, the installation of aerial lines would result in disturbances only at intervals along the path of the transition corridor (such as for the placement of towers) or predetermined locations where the construction or installation of facilities was required (such as for the construction of substations). Consequently, impacts on surface geology would be limited to the sites selected for the erection of structures. At these locations, geologic impacts would be limited to minimal disturbances of subsurface rock during drilling and use of augers to prepare foundation holes. Potential impacts resulting from this activity include: displacement of soil and rock during construction activities; alteration of geologic features due to earth-moving activities during construction; increased likelihood of landslides caused by construction activities in areas of steep terrain and unstable soils; and an increased potential for erosion occurring to adjacent lands from either vehicle disturbances associated with construction activities or accelerated runoff resulting from the creation of impermeable surfaces.

As a main feature of implementation, areas with high landslide susceptibility would not have structures placed within them but would instead be spanned by the transmission line, thus avoiding the potential for landslides. Additional care would be taken to minimize disturbance in these areas both to reduce landslide potential and protect construction workers and equipment from slides and falls. In some specific areas, Basin Electric may use helicopter-aided construction in order to minimize ground disturbance in badland areas. This would reduce the need for grading and excavation typically necessary to develop vehicle access to structure locations. As a result of incorporating these mitigation measures, impacts on geology and landforms would be reduced to less-than-significant levels.

As an overall result of the above-described short-term and low intensity disturbances, the impacts of Alternative C on geology and landforms would be minor.

Approximately 73 acres of soils would be permanently impacted to accommodate the Judson, Tande, White, and Blue substations and the Red Switchyard. Increased runoff potentially resulting from the additional acreage of impermeable ground cover could result in localized erosion. However, impacts on soils at these sites, while permanent, would be localized and not extend beyond the area of impact.

Impacts on geologic features, resources, or surface landforms from the construction and operation of the Judson, Tande, White, and Blue substations and the Red Switchyard are anticipated to be negligible. The substation sites are located primarily on terrain with little slope, and impacts on geological resources related to construction and operation of these substations are not anticipated. Some surface grading, subsurface excavation, and trenching would be necessary, but would be relatively shallow and not expected to encounter significant bedrock.

<u>Soils</u>

Under Alternative C, construction activities along the ROW and at the substation/switchyard locations would cause disturbance to soils. Impacts would accrue from construction activities such as vegetation clearing, excavating, grading, topsoil segregation, vehicle traffic, and back-filling. These activities may increase erosion potential by destabilizing the soil surface. Additionally, soil compaction and rutting can result from the movement of heavy construction vehicles along the ROW. However, the degree of compaction and rutting would depend on the moisture content and texture of the soil, weight of equipment, and frequency of movement over the area.

Approximately 4,957 total acres of surface soil would be incorporated into the ROW for the transmission route. While the majority of the acreage within the ROW would not be disturbed, permanent impacts on soils would occur at locations where the approximately 1,625 transmission structures used for the transmission line would be placed. The total permanent disturbance area under Alternative C would be approximately 1.4 acres. The removal of woodland areas would also occur within the ROW. This tree clearing activity would result in adverse impacts on soil structure and subsequent exposure of soils to erosional forces. Additionally, some portions of the ROW are located along areas of steep slopes and incorporate land that is susceptible to landslides. The development of construction access trails would also result in short-term adverse impacts on soils from compaction. Disturbances in these areas are anticipated to be minimal, most access to the ROW would be provided at locations where the ROW crosses existing roads or by using the ROW itself for access along the line.

Overall, impacts on soils from the construction of Alternative C would be low and primarily short term with only minimal long-term impacts.

Approximately 73 acres of soils would be permanently impacted to accommodate the Judson, Tande, White, and Blue 345-kV substations and the Red Switchyard. Increased runoff potential resulting from the additional acreage of impermeable ground cover could result in localized erosion. However, impacts on soils at these sites, while permanent, would be localized and not extend beyond the area of impact.

Prime Farmland

Construction activities associated with the transmission line for Alternative C would have short-term effects on prime farmland soils in portions of the project ROW that would be temporarily closed throughout the duration of construction activity. The temporary loss of these lands would be reversed when construction is completed and these soils would be returned to production. Long-term (permanent) impacts on prime and important farmland soils would also occur where transmission line structures are placed within the ROW. However, these losses would constitute a small fraction of total lands within the project ROW.

The transmission line ROW would cross about 88 acres of prime farmland, 1,604 acres of farmland of statewide importance, and 62 acres of prime farmland if drained or irrigated (see Table 3-5). Together, these categories constitute 35 percent of the total lands in the ROW.

Table 3-5: Acres of Prime Farmland within 150-foot Right-of-way

Farmland Classification	Alternative C (acres)	Expected Permanent Disturbance (acres)
Not prime farmland	3,203	32
Prime farmland	88	0.88
Farmland of statewide importance	1,604	16
Prime farmland if drained	4	0.04
Prime farmland if irrigated	58	0.58
TOTAL	4,957	49.5

Because the amount of expected permanent disturbance occurring from the placement of structures within the ROW constitutes less than 1 percent of the total land within the ROW, it is anticipated that a minimal amount of prime farmland would be permanently taken out of production due to transmission line structures placement within the ROW. As a result, adverse impacts on prime farmland soils under Alternative C would be minor. Alternatively, areas cleared of trees within the ROW on prime farmland could be converted to agricultural use. The reduction in prime farmland availability would represent a small fraction of 1 percent of the 42,077 acres of prime farmland within the larger five county project area (Williams, Mountrail, Mercer, McKenzie, and Dunn counties). This loss is not expected to be significant. As a precautionary measure, however, the Farmland Conversion Impact Rating for Corridor Type Projects documentation (Form NRCS-CPA-106) would be completed and coordinated with the USDA, Natural Resources Conservation Service (NRCS) once the preferred alternative is selected.

For construction of the Judson, White, and Tande 345-kV substations and the Red Switchyard, approximately 12 acres of prime farmland at each location would be permanently taken out of production. In addition to the acres of prime farmland taken out of production for the substations, it is possible that up to 25 acres of prime farmland would be permanently impacted for construction of the Blue Substation. Because the exact location of the substations and switchyard has not been determined, an accurate assessment of the acreage of potentially-impacted prime farmland within the 25-acre Blue Substation and each of the 12-acre White, Judson, and Tande substations and Red Switchyard sites is not known. Conservative estimates assume that all 73 acres of these substation sites are located on prime farmland soils. In addition, there are approximately 90 acres of prime farmland within the transmission line ROW. Structures would permanently remove soils over 1.4 acres, of which only a portion would be classified as prime farmland. This loss is not expected to be significant. However, as a precautionary measure, the Farmland Conversion Impact Rating for Corridor Type Projects documentation (Form NRCS-CPA-106) would be completed and coordinated with NRCS upon selection of the preferred alternative.

Alternative D

Geology and Landforms

Potential impacts associated with Alternative D on geology and landforms within the project area are anticipated to be similar to those for Alternative C. With approximately 1,465 structures used for the construction of Alternative D, the total area of permanent surface disturbance under Alternative D would be approximately 1.3 acres. Approximately 2.2 million cubic feet of displaced soil and/or rock would be anticipated to be removed for structure construction, with some of this material disposed of off-site. Alternative D would cross approximately 15.6 acres within the ROW where landslides have occurred previously, and traverse over approximately 6,334 feet of terrain (21.6 acres within the ROW) with a slope greater than 10 percent. In areas where steep slopes and highly erodible soils occur, an increased potential for landslides may result from these conditions. However, mitigation measures as described for Alternative C would also be incorporated into the project design and implementation under Alternative D. As a result, the impacts of Alternative D on geology and landforms would be minor.

For reasons similar to those described for Alternative C, impacts on geologic features, resources, or surface landforms resulting from the construction and operation of the Judson, Tande, White, and Blue substations are anticipated to be negligible. Impacts associated with the construction and operations of the Red and Killdeer South switchyards are also expected to be negligible.

<u>Soils</u>

Impacts on soils under Alternative D would be similar to those described for Alternative C, and would include soil disturbance and the potential for erosion resulting from construction activities and soil removal for placement of transmission line and substation structures. Alternative D would require approximately 1,465 structures that would permanently occupy approximately 1.3 acres within the ROW. Approximately 120 acres of woodland vegetation clearing would occur within the ROW for Alternative D, resulting in damage to soil structure and exposure of soils to erosional forces. The ROW would also incorporate approximately 16 acres of land that has experienced landslides in the past, indicating the increased potential for erosion in these areas. The total acreage of ROW required for Alternative D is slightly less than Alternative C; therefore, soil impacts would occur over a slightly smaller area. Overall, however, adverse impacts on soils under Alternative D would remain minor.

Approximately 85 acres of soils would be permanently impacted to accommodate the Judson, Tande, White, and Blue substations and Red and Killdeer South switchyards. Increased runoff potential resulting from the additional acreage of impermeable ground cover could result in localized erosion. However, impacts on soils at these sites, while permanent, would be localized and not extend beyond the area of impact.

<u>Prime Farmland</u>

Impacts on prime farmland soils would be similar for both alternatives, with short-term minor impacts during construction throughout the ROW and permanent impacts at the transmission line structure locations. While the total amount of prime farmland and farmland of statewide importance within the ROW is approximately 1,737 acres, it is anticipated that the placement of transmission line structures within the ROW of Alternative D would result in approximately 1.3 acres of prime or important farmland being permanently removed from production, which is comparable to that of Alternative C due to the increased overall length of Alternative D. Overall, adverse impacts on prime farmland soils within the ROW under Alternative D would be minor.

For construction of the Judson and Tande substations, approximately 12 acres of prime farmland at each location would be permanently taken out of production. In addition to the acres, it is possible that up to 49 acres of prime farmland would be permanently impacted for construction of the White and Blue substations and the Red and Killdeer South switchyards. Because the exact location of the substations and switchyards has not been determined, an accurate assessment of the acreage of potentially-impacted prime farmland within the 25-acre Blue Substation and each of the 12-acre White Substation and Red Switchyard sites is not known. Conservative estimates assume that all 85 acres of these substation sites are located on prime farmland soils. Additionally, there are approximately 90 acres of prime farmland within the transmission line ROW. Structures would permanently remove soils over 1.4 acres, of which only a portion would be classified as prime farmland. This loss is not expected to be significant. However, as a precautionary measure, the Farmland Conversion Impact Rating for Corridor Type Projects documentation (Form NRCS-CPA-106) would be completed and coordinated with NRCS upon selection of the preferred alternative.

Alternative E

Impacts on geology and soils occurring under Alternative E would be similar to those described for Alternative D because the alignment would traverse the same terrain under both alternatives. However, the amount of disturbance under Alternative E would be larger because of the construction of an additional 345-kV line north of Killdeer for 63 miles between the Blue Substation and the Red Switchyard, which would result in two parallel lines located within a wider 300-foot ROW.

<u>Geology and Landforms</u>

Alternative E would result in the removal of 2.7 million cubic feet of soils, compared to 2.2 and 2.4 million cubic feet under Alternatives D and C, respectively. Impacts on soils under Alternative E would be slightly greater than those described for Alternatives C and D, with 1.6 acres of surface soils permanently removed as a result of the placement of approximately 1,832 structures. Alternative E would cross approximately 24.4 acres within the ROW where landslides have occurred previously, and traverse approximately 12,507 feet of terrain (42.6 acres within the ROW) with a slope greater than 10 percent. In areas where steep slopes and highly erodible soils occur, an increased potential for landslides may result from these conditions. However, mitigation measures, similar to those described for Alternative C would also be incorporated into the project design and implementation for Alternative E. As a result, the impacts of Alternative E on geology and landforms would be minor.

For reasons similar to those described for Alternative C, impacts on geologic features, resources, or surface landforms resulting from the construction and operation of the Judson, Tande, Blue, and White substations are anticipated to be negligible. Impacts associated with the construction and operations of the Red and Killdeer South switchyards are expected to be negligible.

Soils

Impacts on soils under Alternative E would be similar to those described for Alternatives C and D, and would include soil disturbance and the potential for erosion resulting from construction activities and soil removal for placement of transmission line and substation/switchyard structures. Approximately 189 acres of woodland vegetation clearing would occur within the ROW for Alternative E, resulting in damage to soil structure and exposure of soils to erosional forces. For 63 miles north of Killdeer, between the Blue Substation and the Red Switchyard, the total acreage of ROW required for Alternative E would be larger than either Alternatives C or D; therefore, soil impacts would occur over a larger area. Overall, however, adverse impacts on soils under Alternative E would remain minor for the majority of the route.

Approximately 85 acres of soils would be permanently impacted to accommodate the Red and Killdeer South switchyards and the Judson, Tande, White, and Blue substations. Increased runoff potential resulting from the additional acreage of impermeable ground cover could result in localized erosion. However, impacts on soils at these sites, while permanent, would be localized and not extend beyond the area of impact.

Prime Farmland

Impacts on prime farmland soils would be similar among all alternatives, with short-term minor impacts during construction throughout the ROW and permanent impacts at the transmission line structure locations. While the total amount of prime farmland and farmland of statewide importance within the ROW is approximately 1,900 acres, it is anticipated that the placement of transmission line structures within the ROW of Alternative E would result in approximately 1.6 acres of prime or important farmland being permanently removed. Overall, adverse impacts on prime farmland soils within the ROW under Alternative E would be minor.

Prime farmland for Alternative E would be the same as for Alternative D. Up to approximately 85 acres of prime farmland could be permanently taken out of production. This loss is not expected to be significant. However, as a precautionary measure, the Farmland Conversion Impact Rating for Corridor Type Projects documentation (Form NRCS-CPA-106) would be completed and coordinated with NRCS once the preferred alternative is selected.

3.4 WATER RESOURCES

3.4.1 Affected Environment

The complete affected environment text for Water Resources can be found in the DEIS in Section 3.4.1, Affected Environment, on pages 3-51 through 3-61.

3.4.2 Direct and Indirect Effects

To determine whether the proposed project would have the potential to result in significant impacts to water resources, it is necessary to consider both the duration and the intensity of the impacts. Definitions for duration and intensity of water resources impacts established for this project are described in Table 3-12 of the DEIS on page 3-62.

Because construction activities would not result in any detectable change to groundwater quality, no wells would be drilled, and no groundwater would be used, no direct impacts are anticipated to groundwater resources under the no-action alternative, Alternative C, Alternative D, or Alternative E as a result of either the construction or operation of the project.

No-action Alternative

Under the no-action alternative, the proposed project would not be constructed, and there would be no impacts on surface water resources or floodplains.

Action Alternatives

Construction and operation of the project under all three alternatives have the potential to impact surface water resources. These impacts include: increased sedimentation into surface waters from stormwater runoff, increased sedimentation into USEPA-classified impaired waters from stormwater runoff or construction activities, and the possible introduction of contaminants into surface water resources.

There would also be the potential for impacts on floodplains, including disruption of floodwaters due to structures in floodplain areas, and loss or impairment of floodplains and floodplain storage. The project would locate structures outside of floodplains to the extent practicable, such that potential impacts would be expected to be minimal. If structures are placed directly in floodplains, construction of the transmission lines would not be expected to alter existing drainage patterns or floodplain elevations due to the small footprint of the poles and their relatively wide spacing. No change in floodplain functions would occur from construction of the project under Alternatives C, D, or E.

<u>Proposed Substations</u>

Minimal impacts on surface water resources resulting from the construction and operation of the proposed Judson, Tande, White, or Blue substations and the Red and Killdeer South switchyards are expected because of the use of BMPs to prevent soil erosion and sedimentation (see Appendix A of this document). No streams or other waterbodies are present within any of the substation/switchyard sites. The Tande 345-kV Substation would be located within a larger parcel of land being acquired by Basin Electric, but the actual site location is yet to be determined. An unnamed tributary to Paulsen Creek is located on the eastern portion of this property, but the substation site would be constructed on the western side of the property, and the use of BMPs would minimize impacts on this stream. All construction activities would employ BMPs to prevent erosion or sediment runoff that may impact any nearby waterbodies. Minimal impacts on floodplains resulting from the construction and operation of the proposed substations are expected. The substation sites would not be located within Federal Emergency Management Agency (FEMA)-designated floodplains.

Alternative C

The ROW for Alternative C would cross 14.3 acres of open water, 19 perennial waterways (including the Little Missouri River (twice) and Missouri River), and numerous intermittent streams. Three of the crossings would be over waterbodies classified by USEPA as impaired waters. Alternative C would cross Antelope Creek shortly after exiting the AVS Substation, the Little Missouri River east of U.S. Highway 85 and TRNP, and west of ND State Highway 22 and the Little Muddy River north of Williston. All of these waters are listed as impaired due to high fecal coliform levels resulting from nearby agricultural activities. It is not anticipated that construction would contribute to further fecal coliform contamination, although access to the corridor through agricultural areas may have minor impacts. BMPs would be implemented to reduce this impact where necessary (see Appendix A of this document). Since there are no other major sources of impairment requiring total maximum daily loads in areas where crossings would occur (USEPA, 2011), impacts are expected to be minor. All stream crossings, including the impaired waters, would be spanned by Alternative C, and no transmission structures would be placed in the streambed. Basin Electric would obtain all necessary permits for the protection of water resources including wetlands and water quality. Because standard BMPs would be followed, minimal impacts on water resources during operation of the proposed project are anticipated.

Considerable area within the Missouri River lowlands is subject to regular flooding. However, very little of this area is designated as floodplain on the FEMA Flood Insurance Rate Maps (FIRM), which designate floodways and 100- and 500- year flood zones. The 150-foot-wide ROW for Alternative C contains approximately 16.5 acres of FEMA-designated floodplain along the length of the route. These designated areas consist of many small, narrow floodplains associated with rivers and streams within the project area. While Alternative C would cross these geographical floodplain areas, all FEMA-designated floodplain areas within the ROW for Alternative C would be spanned and BMPS would be followed; therefore, minimal impacts to these areas are expected during construction or operation of the project. The Missouri River floodplains are located within the bluff-to-bluff area, which is approximately 3 miles across and occurs on lands owned by the U.S. Army Corps of Engineers (USACE) and managed by the North Dakota Game and Fish Department (NDGFD). The project would be constructed parallel and immediately adjacent to an existing 230-kV transmission line and a rural water pipeline within a utility corridor identified by the agencies. Construction would be timed to avoid potential flooding of these areas. Excavated material would be removed to appropriate upland areas. Any debris such as trees or brush generated during construction would be removed from the floodplain or other areas subject to flooding.

Alternative D

Potential impacts on surface water resources resulting from the construction of Alternative D would be similar to those for Alternative C with the exception of only one Little Missouri River crossing west of ND State Highway 22. The ROW for Alternative D would cross 12.7 acres of open waters and 17 perennial waterways, all of which would be spanned. Alternative D would cross Antelope Creek and the Little Muddy River (impaired waters), but would not cross the Little Missouri River in an area where it is classified as impaired. As described for Alternative C, these impaired waters are listed due to high fecal coliform levels resulting from nearby agricultural activities (USEPA, 2011). Since there are no other major sources of impairment requiring total maximum daily loads in areas where crossings would occur (USEPA, 2011), impacts are expected to be minor. Alternative D would cross numerous intermittent streams. All stream crossings, including the impaired waters, would be spanned by Alternative D, and no transmission structures would be placed in the streambed. Basin Electric would obtain all necessary permits for the protection of water resources including wetlands and water quality. Standard BMPs would be followed (see Appendix A of this document), and minimal impacts on water resources during operation of the proposed project are anticipated.

As described for Alternative C, considerable area within the Missouri River lowlands is subject to regular flooding, although little of this area is designated as floodplain on the FEMA FIRM maps. The 150-foot-wide ROW for Alternative D contains approximately 16.5 acres of FEMA-designated floodplain along the length of the route. These designated areas consist of many small, narrow floodplains associated with rivers and streams within the project area. While Alternative D would cross these geographical floodplain areas, all FEMA-designated floodplain areas within the ROW for Alternative D would be spanned and BMPs would be followed; therefore, minimal impacts to these areas are expected during construction or operation of the proposed project. Construction would be timed to avoid potential flooding of these areas. Excavated material would be removed to appropriate upland areas. Any debris such as trees or brush generated during construction would be removed from the floodplain or other areas subject to flooding.

Alternative E

Potential impacts on surface water resources resulting from the construction of Alternative E would be similar to those for Alternative D with the addition of a second Little Missouri River crossing, both west of ND State Highway 22. The ROW for Alternative E would cross 16.3 acres of open waters and 20 perennial waterways, all of which would be spanned. Alternative E would cross Antelope Creek and the Little Muddy River (impaired waters), but would not cross the Little Missouri River in an area where it is classified as impaired. Since there are no other major sources of impairment requiring total maximum daily loads in areas where crossings would occur (USEPA, 2011), impacts are expected to be minor. Alternative E would cross numerous intermittent streams. All stream crossings, including the impaired waters, would be spanned, and no transmission structures would be placed in the streambed. Basin Electric would obtain all necessary permits for the protection of water resources including wetlands and water quality. Standard BMPs would be followed (see Appendix A of this document), and minimal impacts on water resources during operation of the proposed project are anticipated.

Similar to Alternatives C and D, considerable area within the Missouri River lowlands is subject to regular flooding and very little of this area is designated as floodplain on the FEMA FIRM maps. The 150-foot-wide ROW for Alternative E contains approximately 16.5 acres of FEMA-designated floodplain along the length of the route. The designated areas consist of many small, narrow floodplains associated with rivers and streams within the project area. While Alternative E would cross these geographical floodplain areas, all FEMA-designated floodplain areas within the ROW for Alternative E would be spanned and BMPs would be followed; therefore, minimal impacts to these areas are expected during construction or operation of the proposed project. Construction would be timed to avoid potential flooding of these areas. Excavated material would be removed to appropriate upland areas. Any debris such as trees or brush generated during construction would be removed from the floodplain or other areas subject to flooding.

3.5 BIOLOGICAL RESOURCES

3.5.1 Affected Environment

The complete affected environment text for Biological Resources can be found in the DEIS in Section 3.5.1, Affected Environment, on pages 3-65 through 3-89.

3.5.2 Direct and Indirect Effects

This section discusses potential impacts on vegetation, wildlife, wetlands, and special status species resources resulting from construction and operation of the proposed project, including the no-action alternative. Definitions for duration and intensity developed for this project are described in Table 3-17 of the DEIS on page 3-90.

No-action Alternative

Under the no-action alternative, the proposed project would not be constructed, and there would be no new impacts on biological resources.

Action Alternatives

The proposed project would encompass a wide variety of terrain, vegetative communities, and habitat types used by a variety of wildlife. Construction and operation of the proposed project would have impacts on vegetation, wetlands, and wildlife. Appropriate mitigation measures would reduce the severity of these impacts. Potential impacts would include the following:

- Disturbance or change to vegetative communities as a result of construction activities within the ROW
- Introduction and spread of noxious weeds during construction, operation, and maintenance of the transmission line
- Sedimentation within wetland areas caused by construction activities
- Removal of forested wetland vegetation within the ROW during construction
- Removal of wildlife habitat within the ROW
- Fragmentation of wildlife habitat
- Temporary disturbance to wildlife from human presence and disruption to habitat
- Disturbance to aquatic habitats from construction activities
- Changes in predator-prey relationships due to habitat changes (e.g., increased predation by raptors due to the presence of transmission structures for perching)
- Impacts on special status species (ESA-listed or candidate species; USFS sensitive species; and North Dakota Species of Conservation Priority) or their habitat

Vegetation

Potential impacts on vegetation would include short- and long-term effects varying in intensity from low to moderate to high. Impacts would include localized disturbance to vegetative communities caused by construction equipment and vehicles during site preparation, including damage to vegetation from vehicle tires, excavation, grading, and soil stockpiling. Vegetative damage in the ROW due to construction equipment and vehicles would be considered a short-term, low impact in areas that are not being permanently developed.

Shrub vegetation would be cleared within the ROW where necessary, depending on height and terrain, and in areas where construction access trails are required. Clearing of shrub vegetation would have a long-term, moderate impact on vegetation. Construction through forested areas would require the removal of any trees or large shrubs that would interfere with transmission line safety, equipment access, and operation. Vegetation would be permanently removed at each structure foundation location and woody vegetation would be cleared within currently forested areas of the ROW. Clearing forested areas would have a long-term, high impact on vegetation because it results in a permanent conversion. Short-term, low impacts on vegetation are anticipated within the ROW in grassland, cropland, and hayland areas; these vegetation types would be restored within the ROW once construction is completed. Permanent impacts on vegetation would be limited to conversion of forest to non-forest habitat and any loss of vegetation resulting from permanent conversion of new, undeveloped areas, particularly for substation sites. However, Basin Electric would coordinate with NDPSC and the North Dakota Forest Service to determine appropriate mitigation for the vegetation removed. Typically for these types of projects, tree and shrub vegetation is replaced at a ratio of 2:1, reducing the overall loss over time. Mitigation measures for tree and shrub removal impacts are included in Appendix A of this document.

During construction, off-ROW access may be necessary. Construction crews would gain access to the ROW from public roads and section line roads/trails (outside the LMNG), as well as from within the transmission ROW itself in areas with no public access. Access for transmission line construction would be by truck within the ROW. Structures located along section lines would be accessed from section line roads and trails where possible. For most existing access roads and trails, no additional widening, surfacing, or improvements, including culverts, would be necessary. New surface access roads are not anticipated for a majority of the line; however, temporary access trails may be required in certain areas with no access. Areas with steep or rugged terrain, particularly near the Little Missouri River and associated tributaries would likely be accessed by helicopter and would not require additional new roads. New and existing access trails used for construction access would be rehabilitated after construction to comparable or better conditions than they were prior to construction activities. New construction access trails would be restored to the natural condition of the surrounding area. Gates would be installed where fences cross the ROW, and locks would be installed at the landowner's request.

The introduction and spread of noxious weeds as a result of construction of the proposed project would be possible through ground disturbance and transfer by equipment. BMPs during construction and reclamation would be followed to prevent the introduction and spread of noxious weeds, including revegetation of disturbed areas using certified seed and mulch that contains no viable noxious weed seeds and other standard BMPs related to construction and re-vegetation practices within disturbed areas. Basin Electric would also develop a plan for post-construction noxious weed management for the life of the transmission line.

Table 3-6 presents the potential number of acres impacted within the ROW for general vegetation and landcover types along the entire route lengths of Alternatives C, D, and E, and

Table 3-7 provides a more detailed breakdown of specific vegetation communities found within the ROW for Alternatives C, D, and E.[2]

Table 3-6: Vegetation/Landcover Types within the Right-of-way

Vegetation Type	Alternative C ROW Acres	Alternative D ROW Acres	Alternative E ROW Acres
Cropland	1,671.4	1,505.4	1,719.5
Pasture/hay	172.5	127.3	144.9
Grassland herbaceous	2,548.1	2,408.1	3,154.9
Woodland	183.1	119.5	189.4
Developed lands	133.1	106.2	127.2
Scrub/Shrub	187.4	135.3	193.5
Emergent wetlands	35.1	34.0	36.6
Open water	14.3	12.7	14.5
Barren	11.8	10.0	16.6

Source: USDA National Agricultural Statistical Service, Cropland Data Layer, 2012

Table 3-7: Vegetation Communities within the Right-of-way

Vegetation Community	Representative Species	Alt C (acres)	Alt D (acres)	Alt E (acres)
Bluff and badland	sagebrush, rabbitbrush, saltbush	3.0	2.9	4.7
Cliff, canyon, and talus	few if any plants	0.7	0.4	1.5
Cultivated cropland	wheat, barley, corn, sunflowers	1,664.2	1,498.8	1,723.2
Depressional wetland	cattail, three-square bulrush, spikerush	110.0	99.1	125.9
Floodplain and riparian	green ash, eastern cottonwood, stinging nettle	52.0	43.7	50.2
Inter-mountain basins big sagebrush shrubland	silver sagebrush, big Wyoming sagebrush	1.3	0.7	0.9
Inter-mountain basins big sagebrush steppe	western wheatgrass, needleleaf sedge, big Wyoming sagebrush	1.8	1.6	1.7
Introduced upland vegetation–perennial grassland and forbland	smooth brome, crested wheatgrass, sweet clover	25.2	31.8	33.3
Northwestern great plains mixedgrass prairie	green needlegrass, blue grama, little bluestem	2,526.1	2,334.1	3,078.5
Northwestern great plains shrubland	buffaloberry, silverberry, snowberry	39.0	30.2	41.8

[2] Vegetation community data was obtained from the North Dakota GAP Analysis Program and compared to vegetation data obtained from the National Land Cover Dataset. Because impacts on vegetation are similar between vegetation types (i.e., all wooded vegetation communities would be cleared and subject the same type of impact), National Land Cover Dataset data was used for route comparison.

Vegetation Community	Representative Species	Alt C (acres)	Alt D (acres)	Alt E (acres)
Pasture/hay	alfalfa, smooth brome, bluegrass	178.1	136.0	152.8
Western great plains dry bur oak forest and woodland	bur oak, serviceberry, red cedar	19.3	19.3	34.9
Western great plains sand prairie	prairie sandreed, blue grama, needle and thread	28.6	28.8	47.4
Western great plains wooded draw and ravine	green ash, chokecherry, snowberry	123.8	81.3	130.0

Source: Strong, et al. 2005

Proposed Substations

The proposed 345-kV substations/switchyards would require the permanent removal of all vegetation within the fenced area of the sites (approximately 12 acres each for the Judson, Tande, and White substations and the Red and Killdeer South switchyards, and 25 acres for the Blue Substation) because the sites would be converted to utility use (85 acres total). These sites would be located in grassland or cropland areas to avoid clearing woodland vegetation. Impacts on vegetation within the substation boundaries would be long term and moderate. Removal of vegetation in these areas is not expected to negatively impact local plant populations or population range-wide stability.

Short-term impacts associated with the construction of the project would include the disturbance of herbaceous vegetation along temporary construction access trails, as well as temporary disturbance of vegetation within the ROW boundary for access during construction. Grassland vegetation comprises the most acreage within the ROW for each alternative, although very little of this area would actually be subject to disturbance during construction. Grassland vegetation would be temporarily impacted during construction, but because it is short, removal would be minimal within the ROW except at structure locations, and grassland vegetation would be expected to recover in full once the construction and revegetation efforts are complete. In addition, vegetation used for pasture or hayland would be temporarily impacted, primarily during structure erection and pulling of conductors. In agricultural areas, cropland would be temporarily disturbed within the ROW during construction, but would be re-planted when construction is completed. Long-term grassland vegetation impacts associated with the project would primarily be confined to the removal of vegetation at each structure foundation location, resulting in a permanent loss of vegetation of approximately 1.4, 1.3, and 1.6 acres for Alternatives C, D, and E, respectively over the length of the route, assuming 38.5 square feet per structure and 1,625 structures for Alternative C, 1,465 structures for Alternative D, and 1,832 structures for Alternative E.

Approximately 183, 120, and 189 acres of woodland is located within the proposed ROW for Alternatives C, D, and E, respectively. Typically, trees would be cleared to maintain access to the ROW and appropriate clearance for the safe and reliable operation of the transmission line. For this project, much of the woodland vegetation is associated with deep draws and canyons in badland areas and around drainages. It is likely that many of these areas would be spanned so that the trees would pose no hazard to the transmission line and clearing would be unnecessary. Thus, while the three alternatives contain approximately 120 to 189 acres of woodland, considerably less woodland would likely actually require clearing. Depending on the vegetation adjacent to these wooded areas, cleared woodland areas would likely be converted to grassland or pasture similar to other grassland or pastures found throughout the project area. In addition, though not categorized as woodland, numerous treed windbreaks, shelterbelts, and fencerows would be crossed by the proposed project. Trees within the ROW at these locations would be cleared, and the areas converted to vegetative cover similar to adjacent cleared areas.

The North Dakota Natural Heritage Inventory database indicates that a significant ecological community of western little bluestem prairie is located within 1,000 feet of the centerline for the Red to Charlie Creek segment for Alternatives C, D, and E in Dunn County (North Dakota Parks and Recreation Department, 2011a). It is anticipated that the construction and operation of Alternative C would avoid this sensitive area, since it is not within the ROW. However, if this area would be affected based on the final route alignment for Alternative C, Basin Electric would coordinate closely with the Natural Heritage Inventory and NDGFD to avoid, minimize, or mitigate any adverse impacts to this area. Periodic tree-trimming of the ROW would be anticipated to keep the transmission line clear of any vegetation obstructions during line operation and accessible for maintenance. Herbicides may be used periodically within the ROW to prevent the growth and spread of noxious weeds, control woody vegetation, and prevent stump sprouting. These activities are not anticipated to have any permanent impacts on vegetation outside of the transmission ROW along the length of the route; they would be used according to label specifications by certified applicators within the ROW only. However, it may occasionally be necessary to trim or remove trees adjacent to the ROW that pose a hazard to the safe and reliable operation of the transmission line (danger trees). Management of danger trees would be infrequent, and would have little if any effect on adjacent vegetative communities.

Wetlands

Executive Order 11990, Protection of Wetlands, requires federal agencies to minimize the destruction, loss, or degradation of wetlands when providing federally undertaken, financed, or assisted construction and improvements, as well as other activities. Each agency shall avoid new construction located in wetlands unless “the agency finds (1) that there is no practicable alternative to such construction, and (2) that the Proposal includes all practicable measures to minimize harm to wetlands which may result from such use.”

Impacts on wetland areas within the project area are expected to be minimal; Basin Electric would attempt to avoid impacting wetlands when practicable. When impacts on wetlands cannot be avoided, they would be minimized to the extent possible. Any impacts on jurisdictional wetlands would be permitted and mitigated as appropriate in consultation with USACE.

Table 3-8 provides a comparison of potential vegetated wetland types and acreages within the ROW for Alternative C, D, and E as identified on National Wetlands Inventory (NWI) maps. There are approximately 33.1, 31.3, and 39.9 acres of potential wetlands in the ROWs of Alternatives C, D, and E, respectively. Alternative E potentially has slightly greater acreages of palustrine emergent and palustrine shrub-scrub, and riverine wetland types than Alternatives C and D.

Table 3-8: National Wetlands Inventory-Identified Wetland Acres within the Right-of-way

Wetland Type	Alternative C (acres)	Alternative D (acres)	Alternative E (acres)
Palustrine emergent	13.0	13.4	15.1
Palustrine scrub/shrub	4.0	3.6	8.4
Palustrine forested	0.02	0.02	0.02
Lake	11.1	11.1	11.1
Pond	1.2	1.7	2.6
Riverine	3.7	1.5	2.6
Total	33.1	31.3	39.9

Source: USFWS, 2012b

Short-term, low-intensity impacts on wetland vegetation may occur if construction crews need to access ROW areas through wetlands. When construction is completed, any disturbance to wetlands would cease, and these areas would be restored. Long-term, moderate to high intensity impacts on wetlands would only be expected to forested wetlands because trees and other woody vegetation would need to be removed within the ROW. Impacts to non-forested wetlands would be short term and of low intensity. Several areas of open water wetlands (ponds, lakes, riverine) were identified on the NWI maps, but it is expected that these would be spanned and not impacted by transmission line construction.

After the final route, substation, and switchyard locations are chosen, wetland delineations would be conducted to identify wetlands. Most if not all wetlands are anticipated to be spanned. However, any unavoidable impacts on potentially jurisdictional wetlands, whether temporary or permanent, would be discussed with USACE prior to construction to determine the permitting requirements and conditions necessary for construction involving wetlands within the proposed project ROW. Where impacts on wetland or riparian areas are unavoidable, impacts would be minimized and mitigated. BMPs, as described in Appendix A of this document, would be employed to minimize impacts on wetlands within the ROW during construction. Specific mitigation measures would be approved by USACE during the Clean Water Act (CWA) permitting process.

<u>Proposed Substations/Switchyards</u>

No impacts on wetlands are expected from the construction of the proposed 345-kV substations or switchyards. No NWI-identified wetlands are located within the boundaries of the substation/ switchyard sites, and no wetlands would need to be crossed for access to the sites.

Wildlife

The alternatives would each cross a variety of different habitat areas used by a diverse assemblage of wildlife species. Although construction would result in minor changes in habitat composition for lands within the ROW, project-related impacts would largely be short term, of low to moderate intensity, and typically limited to the construction period and times when workers and equipment are regularly present; except in cases of permanent conversion of habitat to a substation or switchyard or from one habitat type to another (e.g., forest to grassland). Potential impacts on wildlife during the construction and operation phases of the proposed project may include the following:

- Temporary disturbance to wildlife within and near the transmission ROW during construction and transmission line maintenance due to human intrusion, noise, and construction activity
- Disturbance or removal of vegetation that is used as food, shelter, or cover for wildlife species during ROW clearing
- Permanent loss of habitat, particularly wooded areas, shelterbelts, windbreaks, and fencerows
- Loss of forested wetland habitat through permanent conversion to emergent wetlands via clearing
- Habitat fragmentation
- Introduction of sediment into aquatic ecosystems during construction
- Changes in predator-prey relationships due to habitat changes (e.g., increased predation by raptors due to the presence of transmission structures for perching)
- Impacts on special status species (ESA-listed or candidate species; USFS sensitive species; and North Dakota Species of Conservation Priority) or their habitat
- Potential exposure to contaminants such as fuels and chemicals used during construction

Potential impacts, both short and long term, are discussed for specific wildlife types in the following sections.

Big Game

Species such as mule and white-tailed deer, elk, pronghorn antelope, and bighorn sheep would experience a potential loss of foraging and woodland cover habitat due to the clearing and disturbance of vegetation within the proposed ROW. This impact would be considered short term and of low intensity. In most instances, this temporary loss of foraging habitat would be insignificant; available foraging habitat adjacent to the ROW would be sufficient to sustain these species until construction was completed and vegetation within the ROW became re-established. Clearing of woody vegetation and maintenance of a cleared ROW would reduce woodland cover. However, the minimal clearing necessary and the relatively narrow ROW cleared would not permanently displace big game from the area or create a barrier to movement from one area to another across the ROW.

Approximately 4,957, 4,459, and 5,597 acres of land would be incorporated into the ROW as part of Alternatives C, D, and E, respectively. The majority of this area provides some type of habitat for big game. Once construction is completed, approximately 257 acres of habitat (foraging and woodland cover) would be permanently lost as part of Alternative C, while approximately 206 acres would be permanently lost as part of Alternative D, and approximately 276 acres would be lost as part of Alternative E. These acreages include the area occupied by transmission structures and substations, as well as the maximum estimate of forest clearing for each route. Forest clearing would result in a loss of woodland cover, but cleared forest areas would become available foraging habitat once construction is completed. The vast majority of the ROW, once construction is completed and the area restored, would again be available as wildlife habitat. Impacts related to woodland clearing in the ROW are considered long term and of low intensity.

Increased human activity and noise associated with the construction of the proposed project is likely to temporarily displace big game species in the area; however, during breaks in the construction efforts (such as between structure placement and conductor stringing) and when construction is completed, these species would move back into the ROW and adjacent area. Specific, sensitive areas used by certain big game species, such as lambing areas for bighorn sheep, are located within areas of the Little Missouri River Badlands within or near the LMNG. These areas would be crossed by Alternative C. Bighorn sheep could potentially be affected if the project is constructed through or near these areas during the lambing season. Alternative C crosses approximately 153 acres of the LMNG, while Alternatives D and E each cross approximately 57 acres of the LMNG. LMNG lands crossed by Alternatives D and E are also crossed by Alternative C along segments common to all three alternatives. Impacts related to human activity and noise are considered short term and of low to moderate intensity due to displacement and possible impacts during critical periods for some species. However, Basin Electric would coordinate with NDGFD and USFS to avoid construction during bighorn sheep lambing season (April 1 through July 1; and other important times for game species) in the Little Missouri River Badlands area and the LMNG to reduce impacts on big game species (see Appendix A of this document).

Although not as sensitive, elk calving in these areas could also be affected depending on the timing of construction. However, with the implementation of appropriate mitigation measures, big game calving and lambing activities would not be adversely impacted by construction. Following construction, the ROW would provide foraging habitat not dissimilar to that currently present in the area and within existing utility ROWs. No long-term changes in big game use of the area would be anticipated.

Nongame Species

Potential impacts on nongame species such as small mammals, reptiles, and amphibians resulting from construction of the project would include temporary loss of habitat within the ROW in grassland and agricultural areas until revegetation is completed. This impact would be short term and of low to moderate intensity due to the availability of grasslands and agricultural areas in close proximity to the ROW. Permanent impacts on habitat would occur in areas where forest would be cleared within the ROW (conversion from one type of habitat to a different habitat type) and where habitat is converted to a substation or switchyard. These impacts would be long term and of moderate to high intensity. Long-term impacts on non-game species habitat would be limited to forest clearing, estimated to be a maximum of approximately 183, 120, and 189 acres for Alternatives C, D, and E, respectively. These impacts include those associated with substation and switchyard construction.

Although some nongame species would be temporarily displaced during construction of the transmission line, permanent displacement of these species is not anticipated, except potentially in cleared forest areas that may provide habitat for forest-dwelling species and in areas of permanent conversion to substations or switchyards. Forest habitat would be available in other areas near or adjacent to the proposed project ROW and any loss of woodland would be minimal, with adjacent woodland areas still available along the line for refuge during construction and as habitat during project operation. Habitat fragmentation is also not anticipated, due to the relatively open terrain and limited large-tract forested areas. Impacts on non-game species as a result of temporary displacement would be short term and of low to moderate intensity.

Additionally, some minimal mortality of less-mobile or burrowing species may occur from construction vehicles or equipment within the ROW during construction. Impacts on non-game species as a result of construction vehicles would be short term and of low to moderate intensity.

Birds

The Migratory Bird Treaty Act (16 U.S.C. 703-712) makes it unlawful to take, kill, or possess migratory birds covered by the Act. The Act provides that it is unlawful to "pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or eggs of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof." Habitat disturbance or alteration, human disturbance, and collisions with transmission lines would result in impacts on migratory bird species.

Raptors, waterfowl, and other bird species may be impacted by the construction and operation of the proposed project. Potential temporary impacts on raptors and waterfowl species may occur during construction of the proposed project. Foraging areas for these species would be temporarily disturbed during ROW clearing and general construction activities. Impacts on foraging areas due to construction activities would be short term and of low to moderate intensity.

Golden eagles, protected under the Bald and Golden Eagle Protection Act, commonly use native grassland for foraging and badland areas for nesting within the project area. Bald eagles maybe found migrating throughout western North Dakota but nesting is largely limited to the Missouri River and other large waterbody areas. According to data from NDGFD, no known golden eagle nest locations occur within 1,000 feet of the corridors for Alternatives C, D, or E (NDGFD, 2011a). It is likely that nests for other raptor species could occur within or along the proposed project ROW. Nest surveys for golden eagles and other raptors were conducted in a 1 mile area on both sides of the centerline for the western loop of Alternative C during spring 2013. No active golden or bald eagle nests were found. During the 2013 aerial survey, 92 raptor nests representing 5 species were documented. Of these nests, 3 were identified as occupied great-horned owl (*Bubo virginianus*) nests, 17 as occupied red-tailed hawk (*Buteo jamaicensis*) nests, 1 nest was occupied by a Canada goose (*Branta canadensis*), 1 was an occupied unknown raptor nest, and 67 were unoccupied, inactive raptor nests. The selected alternative will be surveyed in 2014 prior to construction.

During ROW clearing and preparation, habitat loss may occur for grassland and forest bird species, causing temporary displacement of local populations. When construction is completed, grassland species would be expected to return to the area as grassland is restored and construction disturbances cease. Therefore, impacts related to temporary habitat loss and displacement for grassland species would be short term and of low to moderate intensity. Forest-dwelling species would likely move into neighboring forested areas adjacent to the ROW during construction and operation of the transmission line. Species dependent on woodland habitat would experience a permanent loss of habitat within the ROW. However, mitigation requirements for tree and shrub replacement would offset some if not all this habitat loss over the long term. Impacts related to permanent loss of forest habitat would be long term and of moderate intensity.

Operation of the proposed project would present the potential for avian collisions with the transmission line, particularly for larger, less maneuverable species and in areas of dense bird congregations, such as migrating waterfowl staging areas in the Missouri River crossing area (Avian Power Line Interaction Committee [APLIC], 2012). Under high wind, fog, or poor light conditions, avian collisions with the line (generally the overhead shield wire, which is smaller and less visible than the actual conductor) may occur. Migratory waterfowl would be especially susceptible to transmission line collisions where the proposed transmission line would be located near migration staging areas (areas where large concentrations of birds stopover and rest during migration) and at the Little Missouri River and Missouri River crossings; these waterways would tend to concentrate waterfowl and provide natural flight corridors. Impacts on birds related to line collisions during project operation would be long term and of low intensity. Alternatives C, D, and E are located entirely within the whooping crane migration corridor, with lengths of 278, 251, and 314 miles, respectively through the migration corridor. Specific impacts on whooping cranes are discussed further in the special status species section and in the Biological Assessment (BA) for the project. A line-marking plan has been outlined in the BA for the project, which would reduce the risk of collision with lines for whooping cranes and other avian species.

Electrocutions of large avian species, particularly raptors, have been known to occur from contact with energized lines. Electrocutions are primarily due to the close vertical or horizontal separation of conductors and other equipment often found in distribution lines. APLIC (2006) states that transmission lines rarely electrocute birds because of the larger separation distance. The phase-to-phase and phase-to-ground separation is adequate to prevent electrocution of avian species. APLIC (2006) also recommends a separation of 60 inches on distribution and transmission lines. Electrocution impacts from operation of the line would be long term and of low intensity as a result of the avian protection elements that would be incorporated in the design of the line and transmission structures.

The presence of the utility line structures may also impact raptor predator-prey relationships by providing additional locations from which raptors can hunt (perches). Changes to raptor predator-prey relationships are expected to be long term and of moderate intensity.

As part of project implementation, USFWS and NDGFD would be consulted to develop and implement a plan to protect any identified nests from adverse effects during construction. Raptors and other birds may use the transmission line structures and switchyard and substation equipment for perching and nesting after construction. Basin Electric has developed a system-wide Avian Protection Plan that would apply to the operation of the line and associated facilities and would address, among other things, nest removal and protection, line collisions, electrocution, and predation effects.

Aquatic Species

Construction-related impacts on fish and other aquatic species are not likely to occur. Placement of transmission structures in any body of water along the course of Alternatives C, D, or E is not proposed. BMPs (in Appendix A of this document) would be employed during construction and maintenance activities to prevent soil erosion and runoff, sedimentation, water quality changes, and contamination of water from herbicides, fuels, and other spills.

Where necessary, temporary low-water crossings or culverts would be installed at ditches, streams, or other watercourses to provide access to the ROW for construction vehicles. Installation of low-water crossings or culverts may require a permit from USACE and/or the state of North Dakota. Basin Electric would coordinate with these entities prior to installing low-water crossings or culverts regarding permitting requirements and construction conditions. Structures would be designed and installed so as not to inhibit fish passage, or create upstream or downstream habitat changes. Impacts related to installation of these structures would be short term and of low intensity as a result of their design and installation. Alternatives C, D, and E would cross an estimated 19, 17, and 20 perennial streams, respectively. As part of project design and constructability, these stream crossings would be evaluated to determine if culverts would be appropriate for equipment crossings. It is anticipated that numerous streams would be too large for culvert installation and would be bypassed by construction. All streams would be spanned and equipment would cross only at designated locations. Clearing of vegetation along stream banks (riparian vegetation) may cause a local increase in water temperature from increased levels of sunlight warming the water, potentially changing the aquatic habitat in these areas. Areas of riparian vegetation may be considered wetlands under the jurisdiction of USACE and may require a permit for disturbance or clearing. Removal of woody riparian vegetation is considered a long-term impact of low to high intensity depending on the location and amount of removal. The majority of woody riparian vegetation occurs within the Missouri River and Little Missouri River valleys. Where Alternatives C, D, and E cross the Missouri River Valley, woody vegetation consists only of a few randomly-scattered trees along the existing U.S. Highway 85 and Western 230-kV line corridor. Woody vegetation at the Little Missouri River crossing would generally be limited to a few acres within a narrow band immediately adjacent to the river, depending on the exact location of the crossing.

Proposed Substations/Switchyards

Construction of the proposed 345-kV substations/switchyards would require the removal of all vegetation within the fenced boundary of the sites. The proposed substation sites (Judson, Tande, and White) and the switchyard (Red and Killdeer South) sites would a total of 85 acres.

The substation/switchyard locations would consist of grassland or cropland habitat. Loss of vegetation in these fenced areas would be permanent, and any available wildlife habitat would be converted to utility use. Impacts on wildlife during construction would be similar to those incurred during construction of the transmission line. Exact impacts on available habitat would be determined upon acquisition of a site. Wildlife species using any available habitat on the proposed substation and switchyard sites would be displaced to available habitat adjacent to these sites.

Special Status Species

The project area may contain habitat for or have known occurrences of federally endangered, threatened, and candidate species; USFS sensitive species and Management Indicator Species (MIS); and North Dakota Species of Conservation Priority. These species are cumulatively referred to in this report as special status species.

USFWS reports five federally listed endangered animal species, including the whooping crane, interior least tern, pallid sturgeon, black-footed ferret, and gray wolf; one federally listed threatened species, the piping plover; one candidate species, the Sprague's pipit; and two proposed species, the Dakota skipper and the northern long-eared bat from the counties crossed by the project (USFWS, 2011g). No federally listed, endangered, or threatened plant species are known to occur in the project area. However, the ROW for Alternatives C, D, and E cross designated critical habitat for piping plovers and suitable habitat for other special status species.

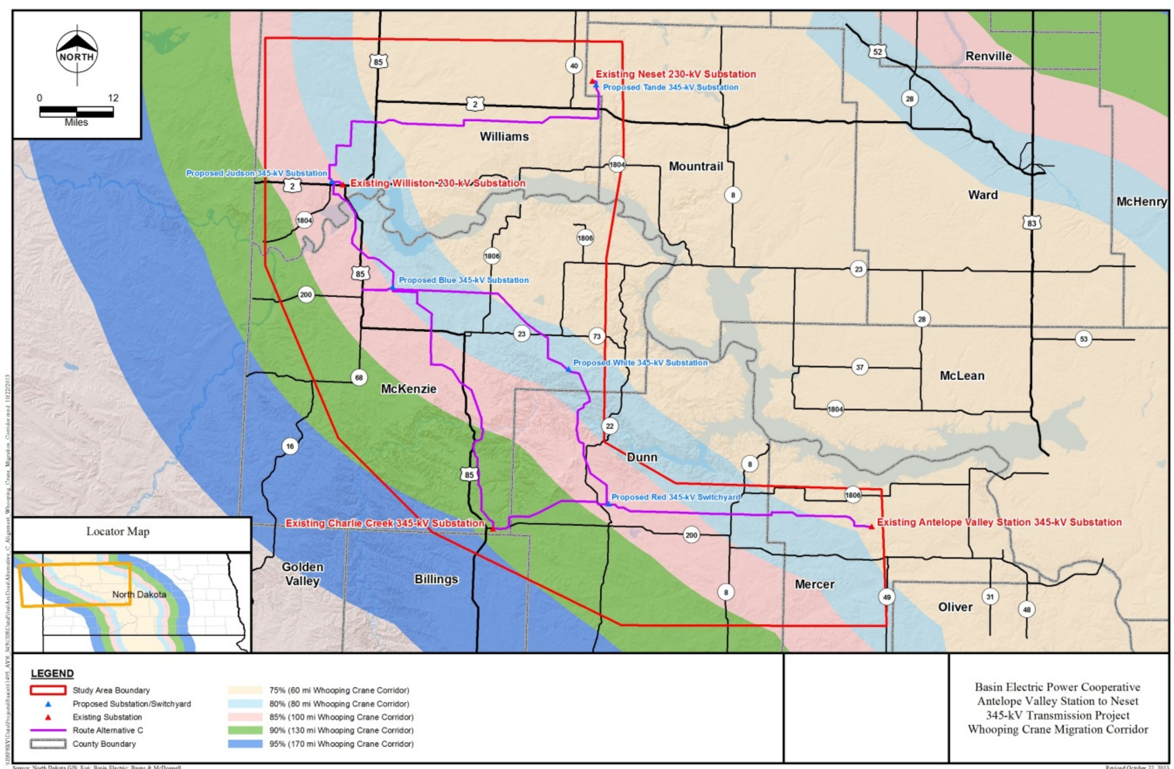
Alternatives C, D, and E each contain 64.8 acres of critical habitat[3] within the ROW for piping plovers. Critical habitat crossed by the project for piping plovers includes the banks of the Missouri River and its associated islands, and sandbars and floodplains of the Missouri River near Williston. Potential impacts on piping plover habitat would include the disturbance to birds and nesting areas and placement of structures within areas of potential nesting habitat. Basin Electric would coordinate with USFWS regarding permitting requirements and construction conditions. At a minimum, it is expected that USFWS would prohibit construction in designated critical habitat during the piping plover nesting season (April 1 to August 31). Impacts on piping plovers cannot be fully identified and quantified until the final engineering analysis has determined the actual location of the structures. Additionally, all alternatives cross the Missouri River near Williston, which is known habitat for pallid sturgeon. Habitat for pallid sturgeon within the project area includes the upper reaches of the Missouri River itself and backwater floodplain areas. Impacts on sturgeon habitat are not anticipated because the project is not

[3] Piping plover critical habitat information was obtained from USFWS maps. Acreage of piping plover critical habitat was determined by measuring the amount of critical habitat occurring within the proposed project ROW.

anticipated to impact surface water habitats or the flooding characteristics of the Missouri River and the adjacent floodplain.

Although critical habitat for whooping cranes has not been designated within North Dakota, much of the project area is within the whooping crane migration corridor, as defined by USFWS, and contains habitat types that whooping cranes use for foraging (e.g., cropfields) and roosting (e.g., wetlands). This migration corridor provides the area within which whooping cranes could be expected to occur during spring and fall migration periods. The centerline of the corridor represents the core of the area followed by the cranes. The wider the migration corridor, the more likely cranes will occur within the corridor area considered. However, as the migration corridor widens out, the likelihood of crane occurrence decreases with distance from the migration corridor centerline. While the potential for crane occurrence at any particular location within the migration corridor would vary from year to year based on weather conditions and associated availability of water, wetlands, and crop stages, over time, the greatest crane occurrence and use would trend toward the centerline of the migration corridor. Figure 3-2 depicts Alternatives C, D, and E in relation to the whooping crane migration corridor.

Figure 3-2 Whooping Crane Migration Corridor



Whooping cranes are highly dependent on wetlands during migration for roosting, resting, and feeding and have been known to use wetland areas within the project area. Wetland acres within 1 mile of the proposed route may also provide an indication of the likelihood of whooping cranes using the project area. Alternatives C, D, and E would be located within 1 mile of approximately 4,881, 4,734, and 4,746 acres, respectively of NWI–identified wetlands for the length of the route.

USFS has identified 20 sensitive animal species in North Dakota that are known to occur in the Dakota Plains National Grasslands, which includes the LMNG (Appendix E of the DEIS). These include eight birds (Baird's sparrow, bald eagle, burrowing owl, greater prairie chicken, greater sage-grouse, loggerhead shrike, long-billed curlew, and Sprague's pipit); three mammals (black-tailed prairie dog, bighorn sheep, and the northern long-eared bat); and nine species of butterfly (Arogos skipper, broad-winged skipper, Dakota skipper, mulberry wing, Ottoe skipper, Powesheik skipper, regal fritillary, and tawny crescent). USFS has also identified 38 sensitive/watch plant species in the LMNG. In addition, USFS has requested that the EIS address two MIS for LMNG: the black-tailed prairie dog and the plains sharp-tailed grouse.

Table 3-9 provides project considerations for federally listed species, and Table 3-10 includes USFS sensitive and MIS animal species for Alternatives C, D, and E. North Dakota Species of Conservation Priority and USFS sensitive/watch plant species are not specifically addressed here because surveys are ongoing; information regarding these species will be provided in the Final EIS. The effects discussion for federally listed species and USFS sensitive species should encompass habitats used by North Dakota Species of Conservation Concern and USFS sensitive/watch plant species.

Table 3-9: Potential Project Considerations for Federally Listed Candidate, Threatened, or Endangered Species

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Whooping crane	Entire length of route of new line within migration corridor; approximately 4,881 acres of NWI-identified wetlands within 1 mile of route.	Entire length of route of new line within migration corridor; approximately 4,734 acres of NWI-identified wetlands within 1 mile of route.	Entire length of route of new line within migration corridor; approximately 4,746 acres of NWI-identified wetlands within 1 mile of route.	No on-the-ground whooping crane use has been documented within the area evaluated in the BA, but whooping cranes will migrate over the proposed project (Western, 2013) each spring and fall. Suitable habitat is crossed by the proposed project. A direct effect to the whooping crane could occur in the event of a collision with the proposed project.	The risk of line collision would be reduced by installation of visual line marking devices on the static wires of the new transmission line. The line marking plan is outlined in the BA for this project.	Based on the determination to mark the proposed project except for approximately 21.6 miles, it is determined that the proposed project **may affect, but is not likely to adversely affect** the whooping crane (Western, 2013).
Interior least tern	Sandbar habitat used by terns would not be affected by transmission line construction or operation.	Sandbar habitat used by terns would not be affected by transmission line construction or operation.	Sandbar habitat used by terns would not be affected by transmission line construction or operation.	Least terns may pass through the project area during migrations, but are not known to currently nest within or near the project area, including the Missouri River (Western, 2013).	Construction would occur either outside of the nesting period (April 1 through August 31) or a qualified biologist would search for nesting least terns within potential nesting habitat prior to construction activities within the project area at the Missouri River crossing. If occupied by least terns, no construction would occur within 0.5 mile of the nesting area until all adults and young have departed. If least terns fly through the area during migration, the risk of line collision would be reduced by installation of visual line marking devices on the static wires of the new transmission line.	With implementation of the visible line marking and construction outside of suitable habitat, the proposed project **may affect, but is not likely to adversely affect** the interior least tern (Western, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Pallid sturgeon	None.	None.	None.	The proposed project would not directly impact the Missouri River or other habitat for pallid sturgeon (Western, 2013). No structures would be placed directly in the Missouri River and no boats would be used to cross the river during construction or operation of the proposed project. No direct impacts to pallid sturgeon due to the proposed project are anticipated. While mitigation measures would minimize indirect impacts to the pallid sturgeon, some minor impacts may occur from increased sedimentation if these measures are not 100 percent effective.	By following all the erosion control, fueling, and other BMPs, the potential for sediment and other contaminates would be avoided or greatly minimized from reaching the Missouri River or other waterbody.	The proposed project **may affect, but is not likely to adversely affect** the pallid sturgeon (Western, 2013).
Black-footed ferret	None.	None.	None.	The closest population in Sioux County, North Dakota, is 75 miles south. Also no prairie dog towns are present in the project area (Western, 2013). No direct or indirect impacts are anticipated to black-footed ferrets.	None.	The proposed project will have **no effect** on the black-footed ferret (Western, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Gray wolf	None.	None.	None.	No populations are known to exist within the study area. Transient individuals may occur in the area due to dispersal from populations in the Rocky Mountains, Canada, or Minnesota (Western, 2013). The only potential direct effect to the species would be during construction when a vehicle may strike a transient animal, but occurrence of a wolf in the region is highly unlikely. Requiring slow driving speeds for construction vehicles on rough terrain would further reduce the potential risk of collision.	None.	The proposed project **may affect, but is not likely to adversely affec**t the gray wolf (Western, 2013).
Piping plover	Approximately 64.8 acres of designated critical habitat within the ROW.	Approximately 64.8 acres of designated critical habitat within the ROW.	Approximately 64.8 acres of designated critical habitat within the ROW.	No piping plovers have been documented nesting in the proposed project area. The closest nesting was approximately 4 miles downstream of the U.S. Highway 85 bridge in 1994 (Western, 2013). No work would occur directly within the Missouri River, at primary constituent elements of habitat for piping plovers at the river crossing, or other wetland areas; therefore, no direct effects to the species would occur during construction. The proposed project crosses over designated critical habitat for piping	Construction would occur either outside of the nesting period (April 1 through August 31) or a qualified biologist would search for nesting piping plover within suitable nesting habitat prior to construction activities within the area evaluated in the BA at the Missouri River crossing or at basins greater than 3 hectares within the project area. If the areas are occupied by piping plovers, no construction would occur within 0.5 mile of the nesting area until all adults and young have departed. The risk of collision, either during local foraging flights or migration, will be	With implementation of the visible line marking, construction outside the breeding period, and surveys to confirm no breeding birds are present if construction occurs during the nesting period, the proposed project **may affect, but is not likely to adversely affect** the piping plover or designated critical habitat for the species (Western, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
				plovers at the Missouri River. No direct effect to the primary constituent elements of critical habitat (e.g., bare sandbars and open water) are anticipated. Indirect effects on piping plovers could occur if plovers are nesting near construction activities.	reduced by installation of visual line marking devices on the static wires of the proposed new transmission line.	
Sprague's pipit (also a USFS sensitive species)	Approximately 2,548 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 2,408 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 3,155 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Potential direct effects include collision with the overhead wires, permanent loss of habitat through placement of structures within grasslands, and disturbance of nests, eggs, and adults during construction (Western, 2013). Potential indirect effects include auditory disruption to breeding calls from males from the audible noise produced from the transmission line corona and habitat fragmentation.	Grassland habitat would be re-established when construction is completed. To avoid direct impacts on Sprague's pipit during construction, proposed activities within grasslands larger than 72 acres would be limited outside of the April 15 to August 1 time period. If construction is not limited to this time period, surveys would be done prior to construction to determine occupancy of the ROW within grasslands larger than 72 acres. If the area contains Sprague's pipit occurrence, no proposed construction would occur within 958 feet of the occupied parcel except if the construction is on the opposite side of a current disturbance (e.g., road). The risk of collision, either during local foraging flights or migration would be reduced by installation of visual line marking devices on the static wires of the proposed new line.	The proposed project **may impact** individual Sprague's pipit or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Dakota skipper (also a USFS sensitive species)	Approximately 2,548 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 2,408 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 3,155 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Potential direct effects include direct mortality of adults, the removal or destruction of eggs or larvae, and the loss of habitat due to construction of the proposed transmission line and associated infrastructure if construction occurs within occupied habitat. Indirect effects are not expected.	Grassland habitat would be re-established when construction is completed.	The proposed project **may impact** individuals or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013)

Table 3-10: Potential Project Considerations for U.S. Forest Service Sensitive and Management Indicator Species (Animals Only) on U.S. Forest Service Lands

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Northern long-eared bat	Approximately 183 acres of woodland habitat within the proposed ROW. No known hibernacula in the ROW.	Approximately 120 acres of woodland habitat within the proposed ROW. No known hibernacula in the ROW.	Approximately 189 acres of woodland habitat within the proposed ROW. No known hibernacula in the ROW.	Potential direct effects from the proposed project include collision with the overhead wires, and permanent loss of habitat through placement of structures in sites that are in close proximity to potential hibernacula, forested areas, and water sources. Possible indirect effects to include auditory disruption (from the audible noise produced from the corona generated by the transmission line).	To decrease direct impacts on the species during construction, proposed construction activities within 1,000 feet of suitable hibernacula would be avoided during the winter hibernation period (roughly late fall to early spring). In addition to avoiding hibernacula during construction, all mature, dead, or dying trees would be left intact, where they do not pose a safety concern for line reliability.	The proposed project **may affect, but is not likely to adversely affect** the northern long-eared bat (Western EcoSystems Technology, 2013).
Baird's sparrow	Approximately 2,548 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 2,408 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 3,155 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Potential temporary disturbance to native grassland habitat within the ROW during construction of the project.	Grassland habitat would be re-established when construction is completed. Direct impacts on Baird's sparrow would be avoided during construction by searching for nesting birds ahead of ground-disturbing equipment if construction occurs between April 15 and August 1; occupied nests would avoided.	Habitat for Baird's sparrow is likely present on the LMNG parcels crossed by the proposed project; therefore, the proposed project **may impact** individuals or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).
Bald eagle	No known nests within 1 mile of the centerline of the southern loop of Alternative C, which was	Raptor nest surveys to be conducted in 2014.	Raptor nest surveys to be conducted in 2014.	The proposed project would cross the Missouri River; therefore, nesting bald eagles and their habitat could be impacted. Migratory bald eagles could be impacted at any of the locations where the	Basin Electric would follow Dakota Prairie Grasslands standards and guidelines related to bald eagles (USFS, 2001). No noise or activities within 1 mile of a bald eagle nest on USFS lands from February 1 to	The proposed project **may impact** individual breeding or migratory bald eagles or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
	surveyed in spring 2013. The remainder of the route will be surveyed in 2014.			proposed project crosses LMNG parcels. Impacts might include injury or death resulting from collisions with the transmission lines or towers, or avoidance of nests or other habitat features due to construction or presence of the proposed transmission line. (Surveys were completed 1 mile in each direction from the centerline for a portion of Alternative C.)	July 31. No noise or activities within 1 mile of a bald eagle winter roost from November 15 to March 1 on USFS lands. Basin Electric would develop an Avian Protection Plan for operation of the line and associated facilities and the majority of the proposed project would have line markers installed in minimize potential for line collisions.	(Western EcoSystems Technology, 2013).
Burrowing owl	Approximately 2,548 acres of grassland within the proposed ROW (Table 3-6).	Approximately 2,408 acres of grassland within the proposed ROW (Table 3-6).	Approximately 3,155 acres of grassland within the proposed ROW (Table 3-6).	Although no prairie dog colonies were found in the project area during field visits in May and June 2013, burrowing owls could use other mammal burrows. Presence-absence surveys would be conducted and the impacts to this species' habitat would be quantified once the final design and location of facilities is determined.	Grassland habitat would be re-established when construction is completed. Surveys for burrowing owls would be conducted prior to construction if construction occurs between April 1 and August 1.	The proposed project **may impact** individual burrowing owls or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Greater prairie chicken	None.	None.	None.	No populations known to exist within the project area.	None.	The greater prairie chicken is not known from the LMNG, nor is habitat available in the LMNG portion of the Dakota Prairie Grasslands for this species. Therefore, the proposed project will have **no impact** on this species at this time (Western EcoSystems Technology, 2013).
Greater sage-grouse	Approximately 1.3 acres of sagebrush habitat within the proposed ROW (Strong, et al., 2005).	Approximately 0.7 acre of sagebrush habitat within the proposed ROW (Strong, et al., 2005).	Approximately 0.9 acre of sagebrush habitat within the proposed ROW (Strong, et al., 2005).	Potential disturbance to sagebrush habitat within ROW. Sage grouse are not reported from the project area, but are reported from adjacent counties.	Basin Electric would coordinate with USFWS, USFS, and NDGFD regarding greater sage-grouse habitat. Structures would not be placed within 0.25 mile of active lek sites on USFS lands. Basin Electric would consult with USFWS, USFS, and NDGFD prior to construction within a 2-mile radius of an active lek on USFS lands during the period March 1 through June 15. Sagebrush habitat would be re-established when construction is completed; project-specific mitigation measures would be developed in consultation with USFS and included as	The known distribution of greater sage-grouse in North Dakota does not include the study area, and since they are largely non-migratory, they are unlikely to be found there even incidentally. Therefore, the proposed project will have **no impact** on this species on the LMNG at this time (Western EcoSystems Technology, 2013). Presence-absence surveys will be conducted and the impacts to this species' habitat will be quantified once the final design and location of facilities is determined.

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
					conditions in the SUP.	
Loggerhead shrike	Approximately 2,548 acres of grassland within the proposed ROW (Table 3-6). Approximately 1.3 acres of sage brush habitat within the proposed ROW (Strong, et al., 2005).	Approximately 2,408 acres of grassland within the proposed ROW (Table 3-6). Approximately 0.7 acre of sage brush habitat within the proposed ROW (Strong, et al., 2005).	Approximately 3,155 acres of grassland within the proposed ROW (Table 3-6). Approximately 0.9 acre of sage brush habitat within the proposed ROW (Strong, et al., 2005).	Disturbance to loggerhead shrike habitat might occur on LMNG parcels when shrubs and trees at structure locations are cleared between structures for driving within the ROW.	Sage brush and grassland habitat would be re-established when construction is completed. Direct impacts to loggerhead shrike would be avoided during construction by searching for nesting birds ahead of ground disturbing equipment if construction occurs between April 15 and August 1; occupied nests would be avoided.	Habitat for loggerhead shrike is likely present on the LMNG parcels crossed by the proposed project; therefore, the proposed project **may impact** individual loggerhead shrike or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).
Long-billed curlew	Approximately 2,548 acres of grassland within the proposed ROW (Table 3-6). Approximately 1,671 acres of cropland within the proposed ROW (Table 3-6).	Approximately 2,408 acres of grassland within the proposed ROW (Table 3-6). Approximately 1,505 acres of cropland within the proposed ROW (Table 3-6).	Approximately 3,155 acres of grassland within the proposed ROW (Table 3-6). Approximately 1,720 acres of cropland within the proposed ROW (Table 3-6).	Potential temporary disturbance to grassland habitat and cropland within the ROW through construction of the project (e.g., driving between structures and placement of structures).	Grassland habitat to be re-established when construction is completed. Direct impacts on the curlew would be avoided during construction by searching for nesting birds ahead of ground disturbing equipment if construction occurs between April 15 and August 1; occupied nests would be avoided.	Habitat for long-billed curlew is likely present on the LMNG parcels crossed by the proposed project; therefore, the proposed project **may impact** individual long-billed curlew or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Black-tailed prairie dog (also a MIS for the LMNG)	Approximately 2,548 acres of grassland within the proposed ROW (Table 3-6).	Approximately 2,408 acres of grassland within the proposed ROW (Table 3-6).	Approximately 3,155 acres of grassland within the proposed ROW (Table 3-6).	Potential temporary disturbance to native and non-native grassland habitat within ROW. No known prairie dog towns exist near the ROW, based on USFS and NDGFD data, field surveys, and aerial photography. However, grassland habitat exists on some of the LMNG parcels that could be occupied by black-tailed prairie dogs should they expand into the project area.	Grassland habitat would be re-established when construction is completed.	The proposed project **may impact** black-tailed prairie dog habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).
Bighorn sheep	Approximately 2,548 acres of grassland within the proposed ROW (Table 3-6). Approximately 183 acres of woodland habitat within the proposed ROW (Table 3-6)	Approximately 2,408 acres of grassland within the proposed ROW (Table 3-6). Approximately 120 acres of woodland habitat within the proposed ROW (Table 3-6)	Approximately 3,155 acres of grassland within the proposed ROW (Table 3-6). Approximately 189 acres of woodland habitat within the proposed ROW (Table 3-6)	Potential impacts to foraging, wintering, and lambing habitat. The northern-most LMNG parcel that would be crossed by the proposed transmission line is near, but not within, the Bighorn Sheep management area (3.51) or within Rangelands with Diverse Natural Appearing Landscapes (3.65) concurrent with bighorn sheep. The area where the transmission line would cross this parcel does not contain preferred habitat for bighorn sheep and is close to U.S. Highway 85, but incidental use could occur. Bighorn sheep are likely to avoid the activity and noise associated with construction.	Basin Electric has committed to coordinate with the USFS and NDGFD to avoid construction during bighorn sheep lambing season (April 1 through July 1) in the Little Missouri Badlands area and LMNG.	Because the proposed transmission line does not occur in a bighorn sheep management area, does not contain preferred habitat, and construction will not occur during lambing season, the proposed project would have **no impact** on bighorn sheep (Western EcoSystems Technology, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Northern Redbelly Dace	None.	None.	None.	In western North Dakota, the northern redbelly dace has been recorded from the upper reaches of the Knife River, Heart River, and Cannonball River drainages (Morey and Berry, 2004). The upper reaches of these rivers extend into Billings and Slope counties, but not McKenzie County.	None.	Because this species does not occur near the proposed project, the project will have **no impact** on the northern redbelly dace (Western EcoSystems Technology, 2013).
Arogos skipper	Approximately 2,548 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 2,408 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 3,155 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Potential temporary disturbance to native grassland habitat within the ROW.	Grassland habitat would be re-established when construction is completed.	Habitat for Arogos skipper may be present on the LMNG parcels crossed by the proposed project, but there are no records of Arogos skipper in McKenzie or adjacent counties; therefore, the proposed project **may impact** Arogos skipper habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Since the proposed project will not result in conversion of large tracks of native prairie to other uses, impacts on Arogos skipper habitat will not constitute a primary threat to the species (Western EcoSystems Technology, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Broad-winged skipper	None.	None.	None.	Habitat for broad-winged skipper may be present on the LMNG parcels crossed by the proposed project, but no transmission structures would be placed within wetland boundaries.	None.	Since the broad-winged skipper is not known to occur in western North Dakota, including the LMNG, and habitat for the species, if present, would not be impacted by the proposed project, the project will have **no impact** on the broad-winged skipper (Western EcoSystems Technology, 2013).
Dion skipper	None.	None.	None.	No populations are known to exist in the project area. The species has only been reported from eastern North Dakota. Habitat for Dion skipper may be present on the LMNG parcels crossed by the proposed project, but no transmission structures would be placed within wetland boundaries.	None.	Since the Dion skipper is not known to occur in western North Dakota, including the LMNG, and habitat for the species, if present, would not be impacted by the proposed project, the project will have **no impact** on the Dion skipper (Western EcoSystems Technology, 2013).
Mulberry wing	None.	None.	None.	No populations are known to exist in the project area. The species has only been reported from eastern North Dakota. Habitat for mulberry wing may be present on the LMNG parcels crossed by the proposed project, but no transmission structures would be placed within wetland boundaries.	None.	Since the mulberry wing is not known to occur in western North Dakota, including the LMNG, and habitat for the species, if present, would not be impacted by the proposed project, the project will have **no impact** on the mulberry wing (Western EcoSystems Technology, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Ottoe skipper	Approximately 2,548 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 2,408 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 3,155 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Populations known to exist in western North Dakota (USFWS, 2011d). Potential temporary disturbance to native grassland habitat within the ROW.	Grassland habitat would be re-established when construction is completed.	Habitat for Ottoe skipper might be present on the LMNG parcels crossed by the proposed project and the species has been recorded in McKenzie County; therefore, the proposed project **may impact** individuals or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).
Powesheik skipper	None.	None.	None.	No populations are known to exist in the project area. The species has only been reported from eastern North Dakota.	None.	Tallgrass prairie habitat for powesheik skipper is not found on the LMNG parcels crossed by the proposed project and this species has not been recorded in western North Dakota; therefore, the proposed project will have **no impact** on the powesheik skipper (Western EcoSystems Technology, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Regal fritillary	Approximately 2,548 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 2,408 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 3,155 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Populations are known to exist in western North Dakota. Potential temporary disturbance to native grassland habitat within the ROW. Although tallgrass prairie habitat does not occur on the LMNG parcels crossed by the proposed project, other habitats used by regal fritillary such as damp meadows, marshes, wet fields might occur. However, no transmission structures would be placed within these habitats (i.e., within any wetland boundaries).	Grassland habitat would be re-established when construction is completed.	Habitat for this species will not be affected by the proposed project; therefore, the proposed project will have **no impact** on the regal fritillary, if present (Western EcoSystems Technology, 2013).
Tawny crescent	Approximately 2,548 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6). Approximately 0.02 acre of forested wetland in the proposed ROW (Table 3-8).	Approximately 2,408 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6. Approximately 0.02 acre of forested wetland in the proposed ROW (Table 3-8).	Approximately 3,155 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6). Approximately 0.02 acre of forested wetland in the proposed ROW (Table 3-8).	Populations are known to exist in western North Dakota. Potential temporary disturbance to native grassland habitat within the ROW.	Grassland habitat would be re-established when construction is completed.	Habitat for tawny crescent butterfly might be present on the LMNG parcels crossed by the proposed project and the species has been recorded in McKenzie County; therefore, the proposed project **may impact** individuals or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).

Species	Alternative C	Alternative D	Alternative E	Potential Impacts	Mitigation	Effect Determination
Plains sharp-tailed grouse	Approximately 2,548 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 2,408 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Approximately 3,155 acres of grassland habitat potentially containing areas of suitable native grassland within the proposed ROW (Table 3-6).	Potential temporary disturbance to native grassland habitat within the ROW. Sharp-tailed grouse are a common year-round resident throughout North Dakota (Western EcoSystems Technology, 2013).	Grassland habitat would be re-established when construction is completed. Basin Electric would coordinate with USFS and NDGFD regarding sharp-tailed grouse habitat. Structures would generally not be placed within 0.25 mile of active lek sites on USFS lands. Basin Electric would consult with these agencies prior to construction within a 1-mile radius of an active lek during the period of March 1 through June 15 on USFS lands. If construction is expected to occur within 1 mile of any historic lek during this time period, surveys would be done prior to construction to determine lek use.	Given the overall distance of leks from the proposed project and the commitment to limit disturbance to outside of the lekking period or to certain times of the day during the lekking period, the project **may impact** sharp-tailed grouse or their habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).

Surveys for Protected Species under U.S. Fish and Wildlife Jurisdiction

Coordination occurred with USFWS to determine the level of investigations required to provide information for the BA for this project. As a result of this coordination and in preparation of the BA, desktop reviews and field surveys occurred in the fall 2012 and spring 2013 for the following species.

Whooping Crane—The initial determination of whooping crane habitat within the project study area was determined using the Resource Selection Function methodology discussed with USFWS. This methodology provides a quantitative means by which areas crossed by the proposed project can be compared to areas at different distances from the project. The Resource Selection Function methodology also helps inform plans for marking the proposed project with avian bird diverters. Line markers would be installed along the length of the transmission line, except in areas where the line is greater than 0.25-mile from cropland and/or the line is 0.25-mile or greater from a wetland that is not within a steep-side ravine. These areas were determined to be unsuitable habitat for whooping cranes, and the Resource Selection Function analysis rates these areas low in potential use. Basin Electric would place PREFORMED Line Products' (or equivalent) spiral yellow bird-flight diverters (Model: BFD-MS-3341 and BFD-MS-3164 or equivalent) or equivalent along both shield wires in areas of suitable habitat. APLIC (2012) indicates that marking the center of 60 percent of the spans is effective in reducing strikes because birds see the towers/poles when closer. The visual marking devices would be spaced 50 feet apart, starting 150 feet away from each structure so that the area representing more than 60 percent of the center span would be marked. The visual marking devices would be spaced 100 feet apart, but markers would be staggered with each other to give the appearance, looking from the side, that they are 50 feet apart and to make the shield wires more visible in a horizontal plane. The Resource Selection Function analysis and the line marking plan are discussed in greater detail in the BA.

Sprague's Pipit—Beginning in fall 2012, an analysis of Sprague's pipit habitat was conducted by reviewing aerial photography to determine native prairie grasslands locations within a 2,000-foot survey corridor (1,000 feet on each side of the centerline). An occupancy survey for Sprague's pipit would be conducted prior to construction activities in areas identified as habitat for the species if construction is proposed to occur between April 15 and August 1.

Piping Plover—Beginning in fall 2012, an analysis of piping plover habitat was conducted by reviewing aerial photography and NWI data to determine wetland locations within a 2,000-foot survey corridor (1,000 feet on each side of the centerline). A presence survey for piping plover would be conducted prior to initiating construction activities in areas identified as habitat for the species, if construction occurs during nesting season (April 1 through August 31).

Raptor Nest Surveys—A survey for raptor nests within a 2-mile-wide survey corridor (1 mile on either side of the centerline for the southern loop of Alternative C) occurred in spring 2013. A survey of the remainder of Alternative C and all of Alternatives D and E for raptor nests will be conducted in spring 2014.

Migratory Birds—If construction occurs between April 15 and August 1, areas of grassland, forest, and shrubland would be searched for nesting birds protected under the Migratory Bird Treaty Act.

No surveys would be required for other species under the jurisdiction of USFWS.

U.S. Forest Service Sensitive and Management Indicator Species

Coordination with the USFS Dakota Prairie Grasslands office (USFS, 2012b) resulted in USFS providing a list of sensitive wildlife species. USFS's Region 1 Regional Office prepared this list and identified several taxa as being of special conservation concern in the grasslands areas across Montana, Idaho, North Dakota, and South Dakota. The list is included in Appendix E of the DEIS. USFS also asked that the EIS address two MIS species for the Dakota Prairie National Grasslands: the sharp-tailed grouse and the black-tailed prairie dog (USFS, 2012a). To issue a SUP to cross USFS lands, USFS requested that a Biological Evaluation be prepared and that field surveys be conducted for sensitive plant species that have been identified on USFS lands (Appendix F of the DEIS). These surveys took place during May and June 2013, and the results are included in the Biological Evaluation (Western EcoSystems Technology, 2013). All surveys were conducted in compliance with USFS protocols for the LMNG. No individuals of these species were found during the survey efforts. Although no individuals were found, the proposed project may impact habitat for these species, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. BMPs should be implemented during construction and operations to limit impacts on these species. Disturbance of as little habitat as possible would decrease any direct, indirect, and cumulative impacts on these species. Species descriptions, survey findings, and impact determinations for the sensitive species identified on USFS lands are presented in the Biological Evaluation (Western EcoSystems Technology, 2013) and summarized in Table 3-11.

Table 3-11: Potential Project Considerations for U.S. Forest Service Sensitive Plant Species

Plant Species	Status in LMNG	Survey Data for Project Area in LMNG	Impact Determinations
Alkali sacaton *Sporobolus airoides*	Documented on secondary succession on clay outwashes, tolerant of the saline conditions; also been documented on dry to moist sandy or gravelly soil.	Limited habitat found, but clay outwashes do occur. No alkali sacaton was observed.	Given the low level of direct impact in these areas, general low amounts of potential habitat, application of standard BMPs, and lack of documented occurrence, the proposed project will have **no impact** on alkali sacaton (Western EcoSystems Technology, 2013).
Alyssum-leaved phlox *Phlox alyssifolia*	Documented on sandy or gravelly soils on and around Bullion Butte; also reported on clay banks and limestone ridges of open prairies.	No alyssum-leaved phlox were found, but habitat does occur in the project area.	Given the low level of direct impact within the USFS Grasslands from the project, the significant distance of known populations from the project, application of standard BMPs, and lack of documented occurrence, the proposed project will have **no impact** on alyssum-leaved phlox (Western EcoSystems Technology, 2013).
Blue lips *Collinsia parviflora*	Documented in woody understories, including green ash/elm draws, Rocky Mountain juniper, mesic shrub communities, and occasional xeric shrub communities.	No blue lips were found, but habitat does occur in the project area.	Given the low level of direct impact within the USFS Grasslands from the project, no known populations near the project, no impacts to wetland areas, application of standard BMPs, and lack of documented occurrence, the proposed project will have **no impact** on blue lips (Western EcoSystems Technology, 2013).
Dakota buckwheat *Eriogonum visheri*	Documented on relatively exposed clay/silt substrates with low plant cover such as outwash zones around eroding buttes, saddles, steep convex slopes, and erosional breaks on prairie slopes. Occasional populations documented among dense saltgrass communities.	Limited habitat for Dakota buckwheat was found, but exposed clay/silt outwashes do occur. No Dakota buckwheat was observed.	Given the low level of direct impact within the USFS Grasslands from the project, no known populations near the project, application of BMPs, and lack of documented occurrence, the proposed project will have **no impact** on Dakota buckwheat (Western EcoSystems Technology, 2013).

Plant Species	Status in LMNG	Survey Data for Project Area in LMNG	Impact Determinations
Dwarf Mentzelia *Mentzelia pumila*	Documented on scoria exposures and colluviums with low plant cover; also reported on slopes and sandy plains and occasionally on hard clays and rocky soils.	Limited habitat for the species was found, but dry slopes and sandy plains do occur. No dwarf mentzelia was observed.	Given the low level of direct impact within the USFS Grasslands from the project, no known populations near the project, application of standard BMPs, and lack of documented occurrence, the proposed project will have **no impact** on dwarf mentzelia. (Western EcoSystems Technology, 2013)
Easter daisy *Townsendia exscapa*	Documented on dry plains and hillsides, often with loamy or increased soil development and increased plant cover relative to Hooker's townsendia.	No Easter daisies were found, but habitat does occur in the project area and the species is known to occur in the general area of the project.	May impact Easter daisy habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).
Hooker's Townsendia *Townsendia hookeri*	Documented on dry plains, hillsides, gravelly benches, and weather scoria with low to moderate plant cover, but often clay matrix subsoil.	No Hooker's townsendia were found, but habitat does occur in the project area and the species is known to occur in the general area of the project.	May impact Hooker's townsendia habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).
Lance-leaf cottonwood *Populus* x *accuminata*	Documented in mesic woody draws, often with springs/seeps, and occasionally near springs on open hillsides; also coulees, floodplains, and stream banks.	No lance-leaf cottonwood were found, but habitat does occur in the project area within riparian areas and other treed areas that may need to be cleared of trees.	May impact lance-leaf cottonwood habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).
Limber pine *Pinus flexilis*	Limited to the Limber Pines Research Natural Area. According to the USFS, this species is thought to have been planted in the region specific to the Limber Pines Research Natural Area by Native Americans. As such, it is not expected to be found elsewhere in North Dakota (Western EcoSystems Technology, 2013).	No limber pines were found, but habitat for the species does occur.	Given that the species is thought to be transplanted to the area and has never been found outside of the Limber Pines Research Natural Area, **no impacts** to the species are anticipated from the proposed project (Western EcoSystems Technology, 2013).

Plant Species	Status in LMNG	Survey Data for Project Area in LMNG	Impact Determinations
Missouri pincushion cactus *Escobaria missouriensis*	Documented on prairie slopes and plains, stony to loamy to clayey short-grass to mixed-grass prairie; also reported in woodlands of ponderosa pine (*Pinus ponderosa*) and oak (*Quercus* spp).	Pincushion cacti were found in the project area during the May survey but the species could not be confirmed because they were not yet flowering. These locations were revisited in June with the LMNG botanist who confirmed the pincushion cacti found were <u>not</u> Missouri pincushion cactus.	May impact Missouri pincushion cactus habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (Western EcoSystems Technology, 2013).
Nodding wild buckwheat *Eriogonum cernuum*	Documented on exposed sand substrates with low plant cover in grasslands, hillsides, and sandstone outcrops	No individuals were found.	Given the low level of direct impact within the USFS Grasslands from the project, no known populations near the project, application of standard BMPs, and lack of documented occurrence, the proposed project will have **no impact** on nodding buckwheat (Western EcoSystems Technology, 2013).
Sand lily *Leucocrinum montanum*	Documented generally in shortgrass communities with fine textured substrates; also found in crested wheatgrass communities	No sand lilies were found.	Given the low level of direct impact within the USFS Grasslands from the project, the fact that there are no known populations near the project, only one location for the species is known, application of standard BMPs, and lack of documented occurrence, the proposed project will have **no impact** on sand lily.
Slimleaf goosefoot *Chenopodium subglabrum*	Documented on sandbars, terraces, and dune complexes along rivers and creeks; also documented on exposed sandy substrates in uplands, blowouts, outcrops, colluvium, etc.	No individuals were found, but limited habitat does occur.	Given the low level of direct impact within the USFS Grasslands from the project, avoidance of wetland impacts (not that this is a wetland species, but near wetlands), application of standard BMPs, and lack of documented occurrence, the proposed project will have **no impact** on slimleaf goosefoot (Western EcoSystems Technology, 2013).

Plant Species	Status in LMNG	Survey Data for Project Area in LMNG	Impact Determinations
Torrey's Cryptantha *Cryptantha torreyana*	Documented on dry plains, rock outcrops, escarpments, and pine slopes.	No individuals were found.	Given the low level of direct impact within the USFS Grasslands from the project, the fact that no known populations have been identified near the project, application of standard BMPs, and the lack of documented occurrence, the proposed project will have **no impact** on Torrey's cryptantha (Western EcoSystems Technology, 2013).

Proposed Substations/Switchyards

No special status species or habitat for these species is known to occur within the site boundaries for the substations or switchyards. Impacts on special status species resulting from construction and operation of these sites would not occur.

3.6 CULTURAL RESOURCES

Coordinating Environmental Reviews

In accordance with 36 CFR 800.8(a) of the regulations, "Protection of Historic Properties," implementing Section 106 of the NHPA (16 U.S.C. 470), federal agencies are encouraged to coordinate compliance with the requirements of NEPA and Section 106. The affected environment is one section of the Supplemental DEIS that documents the manner in which Western, as the lead agency for Section 106 review pursuant to 36 CFR 800.2(a)(2), with the assistance of RUS and USFS has coordinated these requirements.

Section 106 Consultation

In February 2012, following publication of the DEIS, the Standing Rock Sioux Tribe (SRST) notified Western, RUS, and the USFS of its interest in participating in consultation. In September 2013, the Sisseton Wahpeton Oyate (SWO) requested and was granted consulting party status by Western. These tribes expressed concerns about the possible impact of the proposed project on cultural resources, including historic properties of traditional religious and cultural significance as defined pursuant to 36 CFR 800.16(l)(1).

During the September 2013 NDPSC administrative hearing on Basin Electric's Route Permit Application for the proposed project alignment , several entities expressed concerns about the possible direct and indirect impacts of project construction on the Killdeer Mountain Battlefield.

The DEIS recognizes the relationship between the project and the 1-acre Killdeer Mountain Battlefield State Historic Site. However, the DEIS does not acknowledge a more extensive boundary for this battlefield because that information was not on file at the State Historical Society of North Dakota, and neither the agencies nor the public provided comment on the potential impact of the project on the Killdeer Mountain Battlefield.

Because of this battle's importance and the possible impact of the project on it, the Killdeer Mountain Alliance requested and was granted consulting party status by Western. Western anticipates that given the issues raised at the NDPSC meeting other parties also will request or be invited to participate in Section 106 review as consulting parties. Following publication of the Supplemental DEIS for review, Western will host a meeting with consulting parties to seek and consider their views about effects on historic properties and the manner in which Section 106 review should be concluded.

On September 6, 2013, the United Tribes of North Dakota, comprising the Three Affiliated Tribes, the SWO, the SRST, the Spirit Lake Nation and the Turtle Mountain Band of Chippewa, passed a resolution (9-13-10) titled "Support for preservation of the Killdeer Mountains Civil War Battlefield at which an undetermined number of Lakota men, women and children were killed on July 28, 1864" (United Tribes of North Dakota, 2013). The United Tribes acknowledge that because the Killdeer Mountain Battlefield is owned by private landowners, the state and federal governments have little authority to protect this site. However, together these tribes oppose further development that would disturb the battlefield or the remains of the many Teton Native Americans killed at the site. Two members of the United Tribes of North Dakota—the SRST and the SWO—are already participating in consultation. Western, RUS, and USFS welcome the participation of the remaining tribes at any time that they might elect to do so.

3.6.1 Affected Environment

A description of the affected environment text for Cultural Resources can be found in the DEIS in Section 3.6.1, Affected Environment, on pages 3-115 through 3-124. This section of the DEIS addresses those impacts on cultural resources that had been identified at that time. However, after publication of the DEIS, additional information regarding important cultural resources within the project corridor was identified and is presented below.

Killdeer Mountain Battlefield

Following the Minnesota uprising of 1862, many Dakota fled Minnesota to Dakota Territory. In response, Brigadier General Alfred Sully lead a U.S. Army expedition against the Teton, Yanktonai, and Dakota (Sioux) Indians that culminated in the Killdeer Mountain Battle on July 28, 1864 (State Historical Society of North Dakota, undated; Clodfelter, 1998; Beck 2013).

The Killdeer Mountain Battlefield State Historic Site, which is located against the Killdeer Mountains approximately 8.5 miles from the town of Killdeer in Dunn County, commemorates this engagement (State Historical Society of North Dakota, undated; Snortland, 2002) with a sandstone slab monument, flagpole marker, and headstones for the two U.S. soldiers killed during the battle. Currently, the only official geographic delineation of the Killdeer Mountain Battlefield is 32DU1094, which encompasses the state historic site, and is believed to mark the approximate location of the Sioux camp.

According to historical records, the battle spread across several miles (State Historical Society of North Dakota, undated). Based on figures given by Sully and his officers in their official reports, the action began at least 6 miles from the Sioux camp and continued up to the camp itself. However, other than Sully's statement that the direction was "west of north," the route of the soldiers' march is not clearly described in the official reports. The most likely approach seems to be the traditional one, on the north side of and up Gumbo Creek from the southeast.

The Army column, which would have been at least 200 yards wide, was shadowed by the Sioux from a considerable distance beyond rifle range and often out of sight beyond hills (War Department, 1880-1906). As the Army approached the camps, the Sioux retreated up into the Killdeer Mountains. Most of the bands that were present had no part in the Minnesota uprising, but Sully attacked nonetheless, killing between 100 and 150 Sioux, while the rest abandoned their camps and fled (Clodfelter, 1998; Beck, 2013). During and following this battle, the Dakota used a sacred cave at the top of a plateau in the Killdeer Mountains, known as the Medicine Hole, as a refuge.

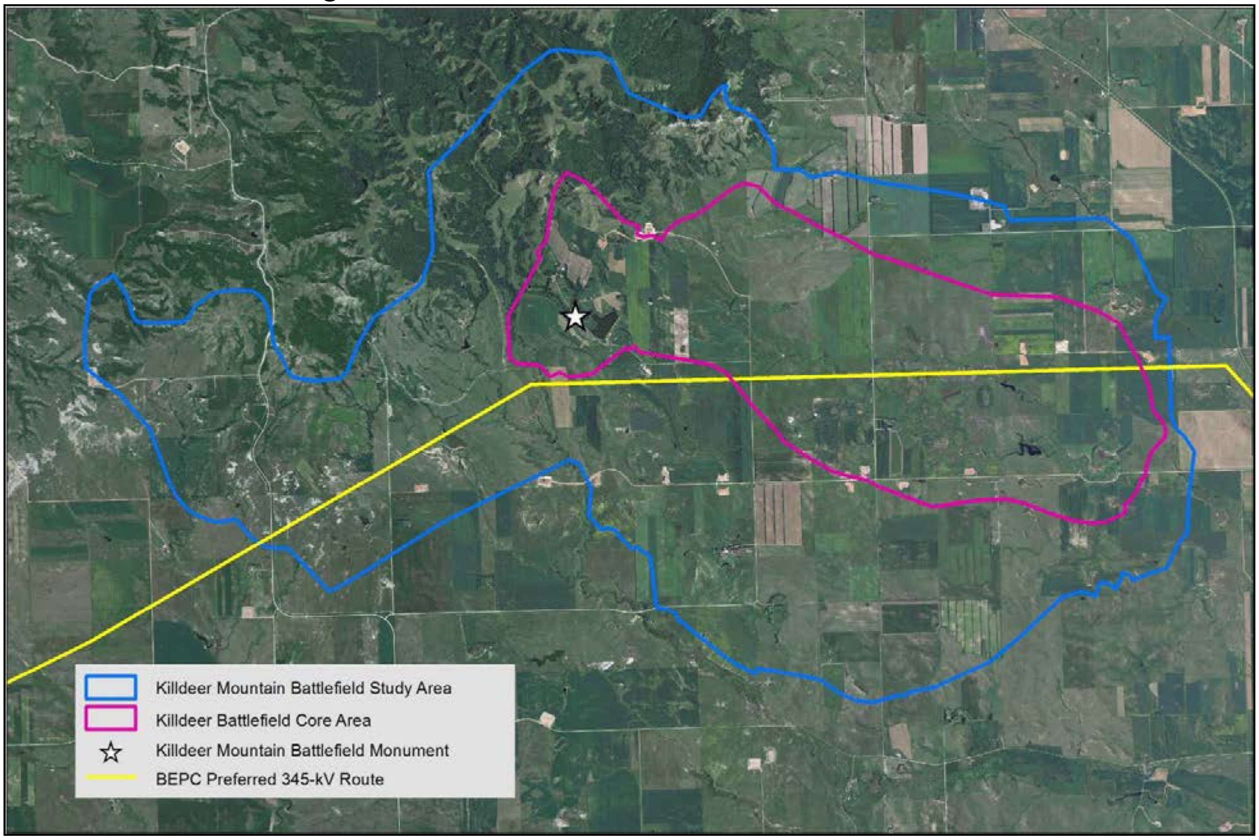
When the Killdeer Mountain Battlefield State Historic Site, which is located approximately 0.5 mile outside of the area of potential effects (APE) for the proposed project alignment, was formally designated in 1993, the full extent of the battlefield's boundaries had not been defined. Then, based on a study titled, *Update to the Civil War Sites Advisory Commission, Report on the Nation's Civil War Battlefields, State of North Dakota* (American Battlefield Protection Program, 2010), the U.S. Department of the Interior, National Park Service's (NPS) American Battlefield Protection Program designated the battlefield as a Civil War Battle and identified potential core and study areas based on a field and condition assessments conducted in 2008. However, NPS acknowledged that the study and core area boundaries, as proposed in the 2010 study, had not yet been field-verified or confirmed through archeological or historical examination.

For NPS, a "study area" represents the historical extent of the battle as it unfolded across the landscape, while a "core area" defines the locations where actual fighting occurred. NPS defined the study area for the Killdeer Mountain Battlefield as encompassing 17,340 acres or approximately 36-square miles (American Battlefield Protection Program, 2010). The core area defined by NPS encompasses the location of the Sioux camps and an area stretching toward the southeast, 5 miles long and 1.4 miles wide and centered on Gumbo Creek. This area represents a preliminary interpretation of the area of maneuvering and fighting (Snortland, 2002). Recently, the North Dakota State Historic Preservation Office (North Dakota SHPO) designated the NPS study area as site lead 32DUX1120. According to North Dakota SHPO guidelines a "site lead" is defined as "…*a location reported by a landowner or other nonprofessional as containing cultural resources. These locations are identified as site leads until such time as a qualified archaeologist or architectural historian can determine whether cultural resources exist in the area and, if so, whether the location is a site or an isolated find*." The term also can be used to characterize a location "*with five or fewer surface visible artifacts which may, in the professional judgment of the archaeologist(s), be only a limited surface expression of a former occupation area where most of the artifacts are not visible (i.e., still buried)*" (State Historical Society of North Dakota, 2012).

In July 2013, the American Battlefield Protection Program awarded two grants to the Center for Heritage Renewal at North Dakota State University. The first grant funds historical research, archeological surveys, and digital mapping of various sites associated with the 1862-1864 Dakota War in Dakota Territory, including the Killdeer Mountain Battlefield. The second grant will support a more concentrated study of the Killdeer Mountain Battlefield. At this time, it is doubtful if either study will be completed before the anticipated publication of the Final EIS, especially since several landowners within the Killdeer Mountain Battlefield core area have not authorized North Dakota State University access to conduct field studies (Isern, 2013). However, to the fullest extent possible, the Western, RUS, and USFS will include information developed by North Dakota State University under the auspices of these grants to inform NEPA and Section 106 decision-making about impacts on cultural resources and effects to historic properties.

Figure 3-3 shows the location of Killdeer Mountain Battlefield State Historic Site, Killdeer Mountain Battlefield study and core areas as defined by NPS in 2010, and the location of the 150-foot preliminary APE for the proposed project alignment. Medicine Hole is not shown on Figure 3-3 in order to protect the confidentiality of its location.

Figure 3-3: Killdeer Mountain Battlefield



Medicine Hole

South Killdeer Mountain, located about 8 miles northwest of Killdeer in Dunn County, is a plateau that rises about 700 feet from the surrounding prairie. The Medicine Hole, which sits atop this plateau at the southern edge, is a small and narrow cave that descends for about 100 feet. Several Native American tribes attach a spiritual significance to both the Medicine Hole and the Killdeer Mountains. The Lakota and Dakota call the Killdeer Mountains Taĥċa Wakutėpi, or "the place where they killed deer." Historically, not only was it an important hunting ground for these and other tribes, but it also served as a place where young men would travel to seek visions. The Mandan call South Killdeer Mountain *Bah-Eesh*, or "the mountain that sings," because of the wind currents that sometimes emanate from the Medicine Hole. This place was where many Earth-naming ceremonies were conducted; ceremonies that have since been lost (Goodhouse, 2013). According to Mandan tradition, the first buffalo emerged through the Medicine Hole. The Tribe also told the story, during their *Okipa* ceremony, of how the spirits who were responsible for killing Little Foolish One hid here to escape the wrath of his father (Bowers, 2004).

According to Lakota tradition, members of the Sioux bands escaped the Killdeer Mountain Battle by making their way into the Medicine Hole and following its narrow pathway to the west exit, headed toward the Badlands. The western exit is now blocked by a landslide, and while some have attempted spelunking the cave, it has proven largely non-navigable (Goodhouse, 2013; Scott and Kempcke, 2000). To this day, Medicine Hole remains a place that is revered by all tribes that possess a historical or spiritual connection to it.

Archeological Resources

Basin Electric completed a Class I background study of the 6-mile-wide project corridor to identify affected historic properties as required in Section 106 review. Basin Electric also conducted a Class II and III archeological survey of the western alignment of the APE. The scope of this survey was confined to those locations where Basin Electric possessed landowner permission for access. An interim report titled, *Basin Electric Cooperative's Antelope Valley Station to Neset 345kV Transmission Line: A Class II and Class II Cultural Resource Inventory in Dunn, McKenzie, Mercer, Mountrail and Williams Counties, North Dakota Interim Report*, was submitted by Western in April 2013 to the SHPO and the SRST for review. The SWO received a copy of this report from Western in September 2013, when it became a consulting party. This interim report only includes the results of cultural resource investigation conducted through 2012.

As noted by the SHPO in the letter dated September 3, 2013, approximately 20 percent of the western alignment APE remained to be examined (State Historical Society of North Dakota, 2013). The eastern alignment has yet to be surveyed for archeological resources. Therefore, additional archaeological fieldwork will be conducted once landowner access has been obtained for the eastern alignment, which is included in Alternatives C, D, and E, and the remainder of the western alignment. Basin Electric will combine the interim report information with the 2013 cultural resources survey findings and the remaining survey to be performed into a final Class II and Class III cultural resources inventory report.

Because of potential impacts to the battlefield, the North Dakota SHPO requested that Basin Electric conduct a geophysical investigation using metal detectors of the 8 miles of proposed alignment that is the same for all alternatives and crosses the study and core areas. In addition to this study, the North Dakota SHPO requested that Basin Electric conduct shovel tests at the proposed location of each structure within the battlefield study area and prepare a separate report describing the findings of these studies for submission to the consulting parties for their review. In summary, shovel tests at only two proposed structure locations yielded prehistoric archeological resources that require more detailed examination to assess their NRHP eligibility. In neither case can these resources be conclusively associated with the battle. Furthermore, archeological evidence that might be unequivocally tied to the battle was not identified during the metal detector survey. Two lead round balls, tow lead "Minnie balls," and one copper cartridge were identified and may be related to the battle. However, because they cannot be precisely dated, such an association is only speculative.

Therefore, definitive evidence of the battle has yet to be identified within the APE. This paucity of evidence of the Killdeer Mountain Battle within the APE of the proposed project alignment suggests that the 2010 NPS study might exaggerate the geographic scope of the core area.

Tribal Cultural Resources

Basin Electric has initiated a survey of the APE for proposed alignment by the SRST preferred contractor to identify cultural resources of importance to the SWO and the SRST, including historic properties of traditional religious and cultural importance to those tribes. In consultation with the SRST and SWO, Western with the assistance of the other two federal agencies determined that to identify possibly affected tribal cultural resources Basin Electric would conduct a pedestrian survey of the 117 miles of uncultivated lands as well as approximately 80 miles of cultivated lands where significant tribal cultural resources might be located as determined by a visual examination. This survey is ongoing, weather permitting.

Although it is possible that the remains of Dakota killed during the Killdeer Mountain Battle could be located within the APE, it is unlikely. The proposed location of the transmission line is believed to be south of the area where the main combat occurred. Additionally, the 2013 tribal resolution states that the Tetons who escaped the battle buried the bodies of their dead relatives in a long line along the hills where they were killed. Therefore, it is likely, that these burials took place close to the main area of combat. The transmission line would be constructed south of this location.

Western will provide the results of this survey, and all other studies done to meet the requirements of Section 106 review, with the other federal agencies, the SHPO, the SWO and the SRST, and as appropriate, other consulting parties for their review and recommendations.

3.6.2 Direct/Indirect Impacts

The construction of the proposed project as an addition to existing transmission and distribution lines could impact cultural resources and adversely affect historic properties, including those of traditional religious and cultural importance to Native American tribes. Definitions for direct and indirect impacts as they pertain to cultural resources under NEPA can be found on pages 3-125 through 3-126 of the DEIS.

In accordance with 36 CFR 800.5(a)(1), an adverse effect occurs

> *when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association.*

The authority to make a finding of adverse effect resides solely with Western, RUS, and USFS and is contingent on the alteration of a historic property's qualifying characteristics in a manner that would diminish those aspects of integrity and/or the criteria of eligibility that apply (36 CFR 60.4). Through the relocation of structures and associated facilities the goal for this project is to avoid adverse effects to historic properties.

Killdeer Mountain Battlefield

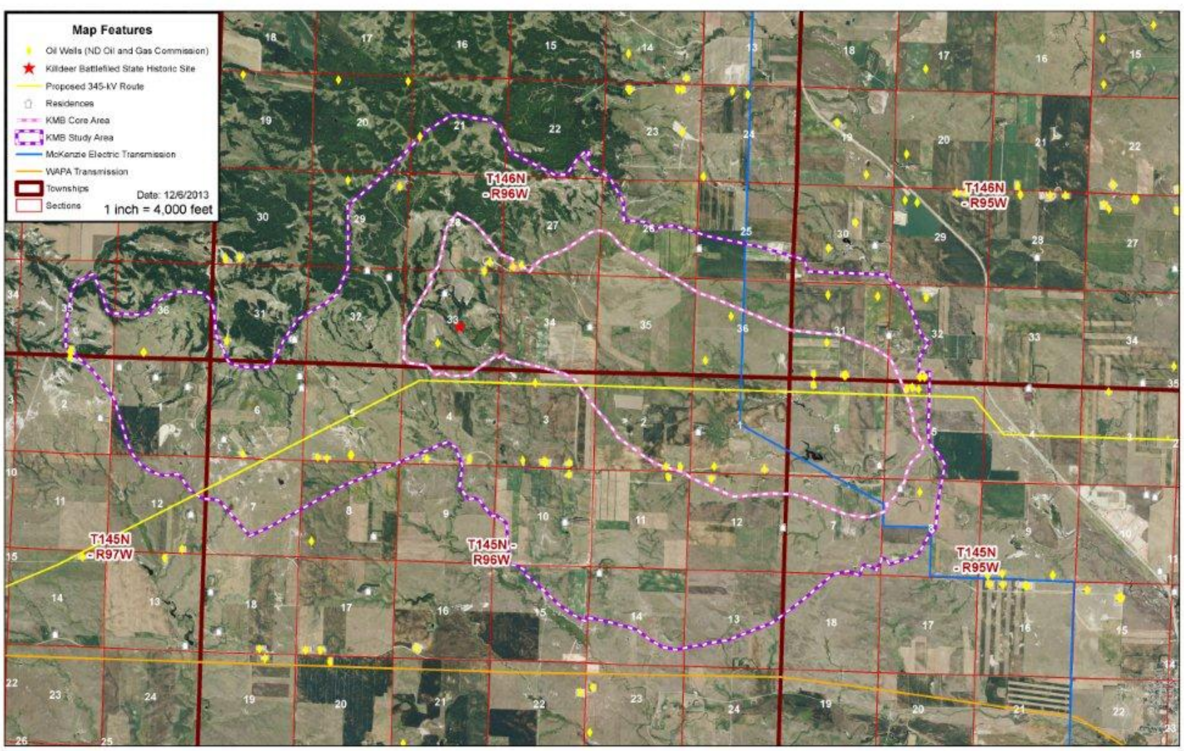
Even without completion of the North Dakota State University studies, Western, RUS, and USFS believe there is sufficient information available to attest to the local and regional importance of the Killdeer Mountain Battlefield as the final engagement in the Dakota War of 1862-1864. Therefore, Western will propose to the North Dakota SHPO and other consulting parties that the Killdeer Mountain Battlefield be treated as eligible for listing in the NRHP for the purposes of Section 106 review of this undertaking. With its considerable importance in the Dakota War, this battlefield as preliminarily defined in the 2010 NPS study will be treated as NRHP eligible under criteria A and D. However, Western, RUS, and USFS recognize that the potential National Register boundaries for the core and study areas that the NPS proposed in 2010 need to be verified.

Based on its 2010 study, NPS described this historic property as "…among North Dakota's most pristine battlefields," but noted that "oil industry interest in sub-surface resources may pose a threat to the historic topography." NPS observed that oil drilling had only negligible impacts thus far "but any full scale effort to extract oil from this area will devastate the landscape."

The landscape that contains the battlefield is largely still agricultural and has not experienced heavy residential or commercial development. However, industrial development, particularly oil extraction have compromised the setting and feeling of the battlefield (Figure 3-4). Figure 3-5 shows the location of oil wells and related facilities in and surrounding the battlefield study and core areas. In addition to the oil wells and related facilities, distribution lines and another electric transmission line cross the core and study areas. Western, RUS, and USFS believe that these structures and facilities have significantly compromised the battlefield landscape and its viewshed. However, given its topography, the battlefield may still meet NPS' basic test for integrity, i.e., whether or not a participant in the battle would recognize it as it exists today.

Figure 3-4: Oil Field Development Near Killdeer Mountain Battlefield Study Area

Figure 3-5: Location of Oils Wells and Related Facilities



Recent pedestrian surveys conducted within the battlefield in response to oil development proposed by the Hess Corporation identified three archeological sites, two of them believed to be of importance (Lee, 2013). The location of these sites is consistent with observations made by Western during a visit with the private landowner whose property encompasses what was likely the most intense area of engagement well to the northwest of the proposed project alignment. Accordingly, the battlefield also should be considered eligible under criterion D for the important information it likely contains.

Medicine Hole

Medicine Hole, and the Killdeer Mountains that contain it, have a documented religious and cultural importance to several tribal nations in the region. Accordingly, Western will propose to the North Dakota SHPO and other consulting parties that Medicine Hole, and the Killdeer Mountains be treated as eligible for listing in the NRHP under criterion A for the purposes of Section 106 review of this undertaking. However, the wide vistas available from Medicine Hole and the Killdeer Mountains in the direction of the proposed transmission line have been compromised by existing infrastructure and extractive activities. As recently as 2008, the viewshed was characterized by widely dispersed residential settlement and associated roads and other infrastructure, including distribution lines. Since then, oil extraction, a more intense activity with its closely packed facilities, has become a significant intrusion into the viewshed.

No-action Alternative

The no-action alternative would not impact existing cultural resources either directly or indirectly, or cause adverse effects to identified historic properties. This alternative would allow for existing conditions to remain as they currently are. Cultural resources, including historic properties, would neither be preserved in another manner nor damaged under the no-action alternative.

Alternative C

A total of 286 cultural resources have been identified within or immediately adjacent to the 1,000-foot preliminary APE (see Table 3-23 of the DEIS). The cultural resources include 4 multicomponent archeological sites, 123 archaeological sites, 86 archaeological isolate finds, 9 archaeological site leads, 26 historic sites, 2 historic isolate find, 18 historic site leads, 16 architectural resources, and 1 architectural site lead.

For Section 106 review, a study to identify built resources, primarily those residential, recreational, commercial, and industrial buildings in the APE that are listed or eligible for listing on the NRHP and may experience indirect (visual) effects from the proposed project would be conducted following selection of the preferred alternative. It is possible that the height of the proposed project may diminish the integrity of a historic property by altering its setting and feeling in those cases where these aspects of integrity are applicable. In determining the level of effort for this study, Western, RUS, and USFS will take into account consulting parties' recommendations as well as existing intrusions to the viewshed that have compromised integrity. No built structures can be located within the ROW; therefore, the ROW would be sited to avoid direct impacts to such historic properties.

Possible mitigation for visual impacts as evaluated under NEPA is discussed in greater detail in Section 3.1, Aesthetics and Visual Resources, of the DEIS.

Alternatives D and E

A total of 88 sites have been recorded within or immediately adjacent to the 1,000-foot preliminary APE of Alternatives D and E including 2 multicomponent archeological sites, 54 archaeological sites, 13 archaeological isolate finds, 4 archaeological site leads, 5 historic sites, 7 historic site leads, and 3 architectural resources.

Similar to Alternative C, it is possible that the height of the proposed project for Alternatives D and E may diminish the integrity of a historic property by altering its setting and feeling. Possible mitigation for visual impacts and evaluated under NEPA is discussed in greater detail in Section 3.1, Aesthetics and Visual Resources.

Killdeer Mountain Battlefield and Medicine Hole

The alignments for Alternatives C, D, and E are identical in the vicinity of the battlefield and the Medicine Hole. Therefore the impacts as described below are the same for all alternatives.

During on-going consultations for the project, in additional to requesting the geophysical investigation and additional archeological testing at each proposed structure location in the battlefield that has been described above, the North Dakota SHPO also asked that Basin Electric move the proposed Gumbo Creek Substation to an alternative location outside the Killdeer Mountain Battlefield study area and complete a visual effects assessment of the proposed transmission line from the perspective of a) Medicine Hole and b) the Killdeer Mountain Battlefield State Historic Site (State Historical Society of North Dakota, 2013). These activities and actions are designed to determine whether project construction in the APE as proposed would impact archaeological remains associated with the battle.

In response to this request, Basin Electric has agreed to move the Gumbo Creek Substation to a location outside of the battlefield study area. In addition, Basin Electric will use galvanized steel single poles rather than the more conventional H-frame poles. The use of the single poles will not only reduce the footprint of the structure but also the intensity of the intrusion.

Visual Impacts

Because the North Dakota SHPO may agree to treat the Killdeer Mountain Battlefield study area and the Medicine Hole as eligible for the NRHP, Western, RUS, and USFS have expanded the visual analysis from the state historic site to the battlefield study area as defined by NPS in 2010. Portions of the transmission line would be visible in the distance from the Killdeer Mountain Battlefield State Historic Site and, at a greater distance, from Medicine Hole. At its closest points, the line would be 0.55 mile south of the state historic site and approximately 2 miles south of Medicine Hole. Figure 3-6, prepared for the visual impact analysis, simulates the visual effect of the transmission line as seen from the closest vantage point at the state historic site. However, because the transmission line crosses the battlefield it will be directly visible within it.

Figure 3-6: View of the Transmission Line from Killdeer Mountain Battlefield State Historic Site

As illustrated in Figure 3-7, for Medicine Hole and the state historic site, the line itself would not dominate the view, although portions of the line would be visible to observers within the project area. No features of the line would be visible in the foreground or middle ground to observers located at either the state historic site or Medicine Hole. Only long-distance views of the line would be available at these key observation points. The same is not true when looking at the battlefield as a whole. The transmission line would be visible both at close range and at long distance depending on where one was standing within the battlefield. However, this transmission line will not be the first to be constructed in or near the battlefield. Currently, a 230-kV transmission line is located just south beyond the 2010 NPS boundary of the battlefield study area. Another 115 kV transmission line crosses the eastern portion of the battlefield through the study and core areas from the southeast to the north (Figures 3-8 and 3-9).

Figure 3-7: View of Transmission Line from Medicine Hole

Figure 3-8: 115-Kv Transmission Line Near the Killdeer Mountain Battlefield Study Area

Figure 3-9: View Looking Towards Killdeer Mountains from ND State Highway 22

In addition to this existing infrastructure, the setting and feeling of both Killdeer Mountain Battlefield and Medicine Hole have been further compromised by the construction of oil production facilities, such as wells, tanks, gas and oil gathering lines, electrical distribution lines, and access roads. In addition to those that already exist, additional wells and their associated infrastructure continue to be constructed. Therefore, the nature of the landscape is being transformed from agricultural to industrial.

The most notable features of the proposed transmission line would be the 70- to 145-foot-high structures that would rise at regular 650- to 1,100-foot intervals. The use of galvanized steel single pole structures would reduce the intensity of any visual intrusion. Therefore, while construction of the proposed transmission line would introduce a new element to the setting, the intensity of its impact would be minimized both by the intensity of existing intrusions and the nature of the structures to be used.

The area today primarily consists of agricultural fields; little native prairie remains. Farmsteads and facilities and infrastructure associated with and needed by oil production are visible from both Medicine Hole and throughout the battlefield (Figure 3-10). Given the undulating terrain and the manner in which oil extraction has altered the rural landscape and the setting and feeling of the historic properties, the transmission line would not present a distinct and major visual intrusion on the surrounding landscape and would blend with the existing linear elements such as roads and fences that characterize the area. Compared with other modern intrusions, visual impacts would be minimal.

Figure 3-10: Typical Land Use Near Killdeer Mountain Battlefield Study Area

Concluding Section 106 Review

When the DEIS was prepared, Western, RUS, and USFS anticipated that Section 106 review would be concluded using a Memorandum of Agreement. However, with the change in scope of the project and increase in the land area involved coupled with restrictions on access, Western, RUS, and USFS agree that concluding Section 106 review with a Programmatic Agreement is more appropriate. While Western will remain the lead for Section 106 review, RUS has agreed to manage the development of the Programmatic Agreement. RUS will ensure that Section 106 review has been appropriately concluded prior to the issuance of the Record of Decision.

3.7 LAND USE

3.7.1 Affected Environment

The complete affected environment text for Land Use can be found in the DEIS in Section 3.7.1, Affected Environment, on pages 3-127 through 3-128. The following section describes land ownership and land use considerations within the project area.

Comprehensive Plans and Zoning Ordinances

The Dunn County Comprehensive Plan, adopted October 12, 2011, establishes a vision for future development of the county and includes general goals and objectives for land use, transportation, housing, economic development, public services, infrastructure, natural resources, intergovernmental cooperation, and planning (Dunn County Planning Commission, 2011a). The Williams County Comprehensive Plan was adopted December 4, 2012, in light of the boom in oil and gas development in the county and associated steep population growth (Williams County, 2012). The plan sets goals and objectives for accommodating future growth in the community, including housing, commercial, and industrial development. The McKenzie County Comprehensive Plan, adopted March 18, 2013, provides goals, objectives, and implementation strategies for the county, as it confronts growth and development issues in the agriculture and energy sectors (McKenzie County, 2013). Areas addressed by the plan include economic development, government, natural resources, land use, public facilities and services, transportation, recreation, and housing. Mountrail County has a comprehensive plan; however, it has not been updated since its adoption in 1982. Mercer County does not currently have a comprehensive plan.

McKenzie, Dunn (Dunn County Planning Commission, 2011b), Mercer (Board of Mercer County Commissioners, 2009), Mountrail, and Williams counties have county-wide zoning ordinances in place. In addition, a few of the organized townships within McKenzie County have zoning codes. All of the alternatives would extend through county and municipal jurisdictions, and would cross lands located in zoning districts where transmission line ROW development is not prohibited. Under the applicable zoning ordinances and comprehensive plans, transmission lines are either a permitted or conditional use in all jurisdictions traversed by the proposed ROW. All applicable zoning and land use approvals would need to be obtained prior to construction.

Private Lands

Most of the land in the project area is privately owned and used for agricultural activities. As a whole, the types of agricultural use taking place within the project area are generally compatible with the presence of transmission line ROWs and would largely be allowed to continue in the long term.

U.S. Forest Service

USFS administers 1,026,000 acres of publicly-owned lands on the LMNG. Within the project vicinity, portions of LMNG are located throughout McKenzie County. In addition to providing recreational opportunities, these lands also support livestock grazing and oil and gas production. The LMNG is managed as a unit of the Dakota Prairie National Grasslands under its 2001 Resource Management Plan (USFS, 2010).

U.S. Fish and Wildlife Service

Lake Ilo National Wildlife Refuge is located near Dunn Center in the southern part of the project area. Lake Ilo National Wildlife Refuge is an approximately 4,000 acre complex consisting of Lake Ilo itself, along with prairie, grassland, and numerous other wetland areas. It is located near Dunn Center in McKenzie County, along ND State Highway 200 (USFWS, 2011a). This area is a popular wildlife viewing area, with waterfowl, shorebirds, and other wildlife using the area at various times throughout the year. Upland areas on the refuge include native prairie, cropland, and tree plantings, and these areas serve also as important wildlife habitat.

Four Waterfowl Production Areas are scattered throughout the project area in Williams County. Waterfowl Production Areas, which are part of the National Wildlife Refuge System, are lands owned by USFWS and managed to preserve high quality wetlands and protect waterfowl breeding and nesting habitat. All Waterfowl Production Areas are open to the public and provide recreational opportunities, such as hunting, bird watching, and hiking (USFWS, 2007a).

National Park Service

TRNP-North Unit, managed by the National Park Service, is located in McKenzie County, south of Watford City along U.S. Highway 85 in the southwestern portion of the project area. This national park provides numerous outdoor activities such as camping, canoeing, fishing, horseback riding, and hiking (National Park Service, 2011). A variety of wildlife species occur within the park, making it a popular wildlife viewing area.

Bureau of Land Management

Within North Dakota, the Bureau of Land Management (BLM) North Dakota Field Office manages approximately 58,000 acres of public land, the majority of which is located in Dunn and Bowman counties. BLM also manages more than 4.1 million acres of subsurface mineral estate, located in the western third of the state (BLM, 2011). Lands managed by BLM within the project area are located primarily in northwestern Dunn County, with scattered tracts in the other counties. These lands are leased for oil and gas production as well as grazing, and are also open to recreational opportunities such as hunting. BLM lands in the project vicinity are managed under the 1986 BLM North Dakota Resource Management Plan, which does not contain any provisions expressly prohibiting the development of utility ROWs.

U.S. Army Corps of Engineers

USACE oversees management of Lake Sakakawea and the public lands surrounding it. In addition, USACE partners with federal, tribal, state, and local entities for management of various parks and recreational facilities and wildlife management areas (WMAs) on these lands (USACE, 2007).

North Dakota Game and Fish Department

State WMAs are located throughout the state; public use regulations for state WMAs are authorized by Chapter 20.1-11 of the North Dakota Century Code and established in Chapter 30-04-02 of the North Dakota Administrative Code. Several USACE lands in and around the project area include WMAs managed for fish and wildlife habitat by NDGFD. Additional NDGFD WMAs in the project area include Killdeer Mountains WMA in Dunn County; Neu's Point WMA, Och's Point WMA, and Overlook WMA in McKenzie County; Sullivan WMA in McKenzie County; Golden Valley WMA in Mercer County; White Earth Valley WMA in Mountrail County; and Blacktail Dam WMA in Williams County (NDGFD, 2010a).

State Parks

North Dakota state parks found within the project vicinity include Lewis and Clark State Park, located along Lake Sakakawea in Williams County, and Little Missouri State Park located north of Dunn Center in Dunn County. Recreational opportunities at Lewis and Clark State Park include fishing, swimming, and boating in Lake Sakakawea. Little Missouri State Park is primarily a primitive park offering backpacking and horseback riding throughout the park's 47 miles of trails (North Dakota Parks and Recreation Department, 2011b).

Easements

USFWS grassland and wetland easements and NRCS Conservation Reserve Program and Conservation Reserve Enhancement Program easements are present in the project area. These areas serve as wildlife habitat to protect rare natural features or to preserve water quality, and have been assigned various levels of legal protection, which generally prohibit development.

The majority of wetland and grassland easements in the vicinity of the proposed project are located in Williams and Mountrail counties in the prairie pothole region. The easements in Williams County are managed by the Crosby Wetland Management District, and the easements in Mountrail County are managed by the Lostwood Wetland Management District. There are also a few scattered easements located in Dunn, McKenzie, and Mercer counties, which are managed by the Audubon Wetland Management District.

Lands with USFWS and NRCS easements typically remain in private ownership and are generally considered confidential by these agencies. As such, information about the specific location and scope of potential impacts to these resources is limited.

3.7.2 Direct and Indirect Effects

This section discusses potential impacts on land use within the region as a direct result of the construction and operation of the proposed project, including the no-action alternative.

Definitions for duration and intensity of project impacts to land use developed for this project are described in Table 3-25 of the DEIS on page 3-129.

No-action Alternative

Under the no-action alternative the proposed project would not be constructed, and there would be no impacts on land use as a result of the project.

Alternative C

Private Lands

Impacts on private lands resulting from Alternative C would include temporary loss of use for landowners within the ROW during construction, and the permanent loss of uses that are incompatible with the ROW, such as the location and development of new oil and gas wells. Disturbance from heavy equipment may result in some crop loss within the ROW during construction. Existing agricultural activities taking place within the transmission line ROW, including grazing and crop cultivation, are likely to experience temporary and localized interruptions during construction. Additionally, cattle would need to be restricted from grazing within the ROW after construction is completed until grass is re-established within the ROW. Indirect impacts on agriculture as a result of the proposed project could include interference with certain agricultural activities, such as the movement of machinery and equipment, obstacles for aerial spraying, or interference with the movement of cattle or other livestock for grazing. At the proposed Judson, Tande, White, and Blue substations and Red Switchyard site, a total of approximately 73 acres of agricultural land would be permanently converted to utility use. Noise, dust, and emissions from vehicles and equipment during construction of the substations and switchyards would have temporary impacts on agricultural uses on adjacent land. The proposed project would require ROW easements from private property owners for transmission lines, which could encumber the ROW area with land use restrictions. Each transmission line easement would specify the present and future right to clear the ROW and to keep it clear of all trees, whether natural or cultivated; all structure-supported crops; other structures; brush; vegetation; and fire and electrical hazards, with the exception of non-structure supported agricultural crops less than 10 feet tall. Substation and switchyard areas would be acquired in fee and converted to utility use.

The relatively small amount of acreage needed for the transmission line ROW and substations/switchyards would have a long-term, low impact on agricultural productivity because of the significant acreages of agricultural land in the project area and throughout the state. Basin Electric would coordinate with landowners regarding routing the proposed transmission line ROW, and would incorporate appropriate mitigation measures. As a result, the short- or long-term impacts on land use for Alternative C would be low.

U.S. Forest Service Lands

Development of utility ROWs is generally consistent with the stated management goals and objectives for the LMNG under the 2001 Resource Management Plan, as long as proper permits are obtained. Alternative C would incorporate approximately 152.9 acres of the LMNG into the utility ROW. These 152.9 acres consist of 102.8 acres of grassland, 19.2 acres of woodland, 12.5 acres of shrub/scrub, 14.7 developed acres, 2.6 acres of pasture/hayland, 0.5 acre of cultivated crops, and 0.6 acre of barren land. Alternative C would not be located within any management areas designated as Roadless. Direct impacts would include the acquisition of ROW and potential clearing of woodland area. Grassland areas within the LMNG would be relatively unaffected by the proposed project. These areas would be restricted from public access during construction but would continue to be accessible to the public following construction and ROW restoration. Woodland areas within the LMNG may be cleared and converted to ROW, which, although a permanent change in the land cover within the easement ROW, would not be inconsistent with land use and management of the LMNG. Should LMNG property crossed by the proposed project be leased for grazing, cattle may need to be relocated or otherwise restricted from the immediate construction activity area within the ROW. Given the relatively limited amount of LMNG lands traversed by the proposed ROW, the presence of existing utilities in this corridor, and the identification of this corridor for future utility development, it is expected that with the incorporation of mitigation measures, Alternative C would have low impacts on land use on the LMNG.

U.S. Fish and Wildlife Service Lands

Alternative C would pass within approximately 2 miles of Lake Ilo National Wildlife Refuge in Dunn County at the closest point. In addition, Alternative C would be situated adjacent to a USFWS conservation easement located in Dunn County that is protected as grassland/pasture. Since Alternative C would not directly cross lands managed or owned by USFWS, there would be no land use impacts on these lands.

National Park Service Lands

Under Alternative C, the western segment of the proposed transmission line would be constructed east of TRNP-North Unit. At its closest point, the transmission line ROW would be approximately 1.5 miles from the park. Due to its height, the proposed transmission line may be visible from areas of TRNP; however, Alternative C would have no direct impacts on existing land uses in the TRNP.

Bureau of Land Management Lands

The proposed transmission line ROW would not directly cross BLM lands. The western segment of the ROW would be located within approximately 200 feet of one BLM parcel. Alternative C would therefore have no land use impacts on BLM lands.

U.S. Army Corps of Engineers Lands

Alternative C would cross approximately 57.9 acres of USACE property in the area of the proposed crossing of the Lewis and Clark WMA managed by NDGFD. Proposed ROW acres on property owned by USACE include 18.2 acres of cultivated crops, 15.9 acres of wetlands, 12.0 acres of grasslands, 5.8 acres of woodlands, 4.0 acres of pasture/hay, 1.5 acres of open water, and 0.5 acre shrub/scrub. Because these lands are in the Missouri River floodplain, during infrequent hydrological events the entire floodplain has been inundated by waters of the Missouri River for short periods of time. Although there may be some land use and access restrictions during construction of the project, Alternative C would have low to no long-term impacts on land use on these lands because the line is immediately parallel to the existing U.S. Highway 85 crossing within a utility corridor containing an existing Western transmission line and a rural water pipeline.

North Dakota Game and Fish Department Lands

As discussed above, Alternative C would cross approximately 57.9 acres of USACE-owned property in the area of the proposed crossing of the Lewis and Clark WMA managed by NDGFD. Although there may be some land use and access restrictions during construction of the project, Alternative C would have low to no long-term land use impacts on these lands because the line is immediately parallel to the U.S. Highway 85 crossing.

State Parks

Little Missouri State Park is the park closest to the project area. The eastern segment of Alternative C would be located more than 4 miles from Little Missouri State Park. Alternative C would have no land use impacts on Little Missouri State Park.

School Trust Lands

Alternative C would cross 31 school trust land parcels, for a total of approximately 202.5 acres within the ROW. Of the 202.5 acres, 176.1 acres are grassland, 3.0 acres are developed, 9.5 acres are cultivated crops, 3.3 acres are shrub/scrub, 4.6 acres is woodland, 4.4 acres are wetland, and 1.7 acres are barren land. Therefore, Alternative C would have low to no land use impacts on school trust lands.

Alternative D

Private Lands

Impacts on private lands resulting from Alternative D would be similar to those described for Alternative C above. These would include temporary loss of use for landowners within the ROW during construction, and the permanent loss of uses that are incompatible with the ROW, such as the location and development of new oil and gas wells. Disturbance from heavy equipment may result in some crop loss within the ROW during construction of the transmission line, and increased noise, dust, and emissions on adjacent agricultural lands during construction of the substations and switchyards. At the proposed Judson, Tande, White, and Blue substations and Red and Killdeer South switchyard, a total of approximately 85 acres of agricultural land would be permanently converted to utility use. Since Alternative D would require fewer miles of ROW, it would impact approximately 813 fewer acres of private land than Alternative C.

U.S. Forest Service Lands

Alternative D would incorporate approximately 57 acres of the LMNG into the ROW. The area within the ROW consists of 47 acres of grassland, 3.9 acres of woodland, 4.4 acres of shrub/scrub, 0.5 acre of cultivated crops, and 1.3 acres of developed land. Alternative D would not be located within any management areas designated as Roadless. Given the relatively limited amount of lands traversed by the Alternative D, and the absence of any special resource management direction for lands within the ROW, it is expected that with the incorporation of mitigation measures, Alternative D would have low to no impacts on land use on the LMNG.

U.S. Fish and Wildlife Service Lands

Alternative D would pass within approximately 2 miles of Lake Ilo National Wildlife Refuge in Dunn County at the closest point. In addition, Alternative D would be situated adjacent to a USFWS conservation easement located in Dunn County that is protected as grassland/pasture. Since Alternative D would not directly cross lands managed or owned by USFWS, there would be no land use impacts on these lands.

National Park Service Lands

Under Alternative D, the proposed transmission line would be located more than 17 miles east of the TRNP at its closest point. Alternative D would therefore have no land use impacts in the TRNP.

Bureau of Land Management Lands

Alternative D would not cross or pass within close proximity to BLM lands, and therefore would have no land use impacts on BLM lands.

U.S. Army Corps of Engineers Lands

Similar to Alternative C, Alternative D would cross approximately 57.9 acres of USACE property, which is in the area of the proposed crossing of the Lewis and Clark WMA managed by NDGFD. Proposed ROW acres on property owned by USACE include 18.2 acres of cultivated crops, 15.9 acres of wetlands, 12.0 acres of grasslands, 5.8 acres of woodlands, 4.0 acres of pasture/hay, 1.5 acres of open water, and 0.5 acre shrub/scrub. Alternative D would cross the same USACE property crossed by Alternative C. Therefore, the impacts on USACE lands would be identical to those described for Alternative C above.

North Dakota Game and Fish Department Lands

Alternative D would cross the same 57.9 acres of USACE land managed by NDGFD that are crossed by Alternative C. Therefore, the impacts on lands managed by NDGFD would be identical to those described for Alternative C above.

State Parks

Little Missouri State Park is the park closest to the project area. Alternative D would be located more than 4 miles away from Little Missouri State Park. Therefore, Alternative D would have no land use impacts on Little Missouri State Park or state park lands in general.

School Trust Lands

Alternative D would cross approximately 23 school trust land parcels for a total of approximately 143.9 acres within the ROW, which is slightly less than Alternative C. Of the 143.9 acres, 128.1 acres are grassland, 6.3 acres are cultivated crops, 2.1 acres are developed, 1.7 acres are barren land, 0.6 acre is shrub/scrub, 4.4 acres are wetland, and 0.8 acre is woodland. With the incorporation of mitigation measures, Alternative D would have low to no land use impacts on school trust lands.

Alternative E

Private Lands

Impacts on private lands resulting from Alternative E would be similar to those described for Alternatives C and D above. However, because Alternative E would require additional ROW mileage to accommodate 63 total miles of parallel 345-kV transmission line from the Red Switchyard to the White Substation and from the White Substation to the Blue Substation. It would impact approximately 115.8 more acres of private land than Alternative C and 928.8 more acres of private land than Alternative D.

U.S. Forest Service Lands

Alternative E would incorporate approximately 57 acres of the LMNG into the ROW. The area of the LMNG within the Alternative E ROW is identical to that traversed by Alternative D, and it is expected that with the incorporation of mitigation measures, the impacts of Alternative E on the LMNG would be identical to those described for Alternative D. Alternative E would have low to no land use impacts on the LMNG.

U.S. Fish and Wildlife Service Lands

Similar to Alternative D, Alternative E would pass within approximately 2 miles of Lake Ilo National Wildlife Refuge in Dunn County and would be situated adjacent to a USFWS conservation easement located in Dunn County. Since the impacts from Alternative E relative to USFWS lands would be identical to those described for Alternative D above, there would be no land use impacts on those lands.

National Park Service Lands

Similar to Alternative D, Alternative E would be located more than 17 miles east of TRNP at its closest point. Alternative E would therefore have no land use impacts in the TRNP.

Bureau of Land Management Lands

Alternative E would not cross or pass within close proximity to BLM lands, and therefore would have no land use impacts on BLM lands.

U.S. Army Corps of Engineers Lands

Alternative E would cross the same 57.9 acres of USACE property traversed by Alternatives C and D. Therefore, the impacts from Alternative E on USACE lands would be identical to those described above.

North Dakota Game and Fish Department Lands

Alternative E would cross the same 57.9 acres of USACE property managed by NDGFD that are traversed by Alternatives C and D. Therefore, the impacts from Alternative E on these lands would be identical to those described above.

State Parks

Little Missouri State Park is the park closest to the project area. Alternative E, similar to Alternative D, would be located more than 4 miles away from Little Missouri State Park and would have no land use impacts on Little Missouri State Park or State park lands in general.

School Trust Lands

Alternative E would cross approximately 33 school trust land parcels for a total of approximately 209.9 acres within the ROW, which is slightly more than the area traversed by either Alternatives C or D. Of the 209.9 acres, 189.5 acres are grassland, 6.6 acres are cultivated crops, 3.6 acres are developed, 2.7 acres are barren land, 0.8 acre is shrub/scrub, 4.8 acres are wetland, and 1.8 acres are woodland. Therefore, Alternative E would have low to no land use impacts on school trust lands.

3.8 SOCIOECONOMIC RESOURCES

3.8.1 Affected Environment

The complete affected environment text for Socioeconomic Resources can be found in the DEIS in Section 3.8.1, Affected Environment, on pages 3-135 through 3-151.

3.8.2 Direct and Indirect Effects

Impacts on socioeconomic resources include how the proposed project could potentially affect elements of the human environment such as population, employment, income, cost of living, property values, housing, and public services. The effects from the proposed project on many of these factors are not limited to the ROW, but would result in impacts across the wider geographic area, affecting the five-county project area. However, some effects, such as property values, would likely only affect residences within proximity to the proposed project. The majority of potential project-induced impacts on social and economic conditions would occur during the construction stage of the project, and therefore, are generally short term and low when compared to all the activities distributed across the larger regional area.

This section discusses the potential effects of the proposed project on the various social and economic characteristics throughout the project area. Economic impacts include impacts that individuals, groups, properties, and businesses would experience from a change in business and economic activity as a result of the proposed project alternatives. Social impacts are borne by individuals or groups who could experience a change in their social structure and context.

Intensity thresholds of impacts on socioeconomic conditions are presented in Table 3-40 of the DEIS on page 3-152.

No-action Alternative

Under the no-action alternative, the project would not be constructed. The regional economy of northwest North Dakota and adjoining areas of Montana is currently heavily influenced by the rapid and widespread oil and gas development associated with the Bakken oil shale fields. The level of oil and gas development that has occurred and is planned for the Bakken region is bringing a considerable number of new jobs and businesses to the area. The introduction of new economic activity requires additional infrastructure, housing, retail stores, and public services. As population and businesses increase across the region, increased amounts of electrical power as well as electrical transmission capacity and reliability are necessary. There would be no change in socioeconomic conditions due to the project under the no-action alternative because direct and indirect revenues from construction of the project would not be realized (construction wages, spending in the communities, and property taxes, among others).

Under the no-action alternative, projected electricity demands in western North Dakota would not be met. This could lead to an increase in the cost of energy and continued dependence on a system at capacity. Additionally, without the proposed project to strengthen the electrical system, reliability of the electrical system could be jeopardized and could result in power outages. In this way, the no-action alternative would indirectly impact existing socioeconomic conditions because local communities and the region would not benefit from the improved electric reliability and capacity anticipated from the project.

Electricity capacity shortfalls would likely limit future development activities needed to accommodate the considerable population, housing, and business growth in the area associated with the current oil and gas boom. Residential, commercial, and industrial growth and development across the region could experience declines in electricity service reliability as early as 2015 (see Section 1.2, Purpose and Need, Load Forecast). Should the load forecast be greater than what is anticipated, service reliability would be affected earlier. Declines in service reliability could lead to lost productivity, and declines in commercial and industrial growth. If the proposed project is not constructed, the load growth would be capped at the projected 2015 load level, no new load growth could be accommodated, and transmission system reliability would decrease.

Alternative C

Construction and operation of Alternative C would result in socioeconomic impacts, including:

- Improved electric reliability and increased capacity for existing and future customers
- Temporary increase in population as a result of the influx of construction workers
- Temporary increase in demand for temporary lodging facilities as a result of the influx of construction workers
- Temporary increase in demand associated with spending on local goods, services, and construction materials
- Potential changes to property values
- Minimal reductions in agricultural production from loss of land for structure placement

- Restriction on the placement of new oil and gas facilities in proximity to the proposed project facilities, although the project would provide for reliable source of electricity for oil and gas operations

As discussed in Section 3.8.1 of the DEIS, the regional economy of northwest North Dakota and adjoining areas of Montana is currently heavily influenced by the rapid and widespread oil and gas development associated with the Bakken oil shale fields. The level of oil and gas development that has occurred and is planned for the Bakken region is bringing a considerable number of jobs and businesses to the area. The introduction of new economic activity requires additional supporting infrastructure, housing, retail stores, and public services. As population and businesses increase across the region, increased amounts of electrical power as well as electrical transmission capacity and reliability are necessary. The continued reliability of electric service to the region is necessary to serve the needs of businesses, housing, and infrastructure to allow the economy of the area to continue to develop.

Approximately 200 annual construction jobs would occur over the 2-year life of construction activity, providing a short-term influx of income to the area (Basin Electric, 2012a). The majority of transmission line construction contractors and workers would temporarily relocate to the project area because transmission construction requires specialized expertise and workforce. A small number of local construction workers could be retained for more general activities. However, due to the tight labor market in the region and low unemployment rates, it is anticipated that most of the construction workforce would come from outside the region. Few workers would be hired locally and permanent jobs are not anticipated to be introduced to the area as a result of the operation of the proposed project (Basin Electric, 2012a).

Although construction would occur over 2 years, individual crews may be required for only a few months in a particular construction area before moving to another area on a subsequent phase of the project. Additionally, construction would not be confined to one area or community. Workers would be spread out over nearly 278 miles in four crews of approximately 50 workers each, for a total of 200 workers. Earnings of 200 construction workers would be about $12.5 million annually, based on average earnings for construction jobs in project area counties (U.S. Department of Commerce, Bureau of Economic Analysis, 2012b, 2012c, 2012d).[4] These earnings represent 0.5 percent of the earnings within project area counties, which were $2.3 billion in 2010 (U.S. Department of Commerce, Bureau of Economic Analysis, 2012d).

As construction workers spend their money in the local area, revenues would likely increase for some local businesses, such as hotels, restaurants, gas stations, and grocery stores, supporting

[4] Average earnings for construction workers of $62,667 in 2010 was based on data available for McKenzie, Mercer, and Williams counties. Construction earnings or employment was not disclosed for Mountrail and Dunn counties.

jobs and incomes for these businesses and their employees. Because construction workers are not anticipated to be permanent residents of the project area, induced spending would be considerably less than locally-residing employees because construction workers will send a portion of their earnings to their home area. Overall, the spending would be short term and is likely to have low socioeconomic impacts on the overall region.

Alternative C would result in increasing transmission capacity and reliability. Additional capacity would provide electricity for the expanding Bakken oil and gas development activities and other future potential development activities in the region. A reliable supply of electricity would continue to support the expanding regional economy as well as existing and new jobs in the project area.

The study area has seen a dramatic increase in population over the past several years as a result of the economic activity and availability of jobs in the area. Between 2000 and 2010, the project area added more than 4,000 new permanent residents, a 9 percent increase (U.S. Census 2000; 2010a). Over the 2 year construction period, there would be a temporarily population increase of 200 people in the project area.

Larger municipalities such as Williston, Beulah, Watford City, and Tioga would likely be impacted the most by the temporary population increase as workers would seek to take advantage of amenities offered in these towns. Temporary population changes in local communities would be low, particularly compared to the current growth in the area.

During construction activities, short-term impacts on nearby residents as a result of the proposed project would include increased noise, visual presence of construction equipment, and potential traffic resulting from the movement of heavy material haul trucks that would likely slow vehicular movements, and lane and road closures during conductor stringing. Long-term impacts on nearby residents as a result of operation of the proposed project would include minor, infrequent disturbance during maintenance or repair activities. Impacts on property values are discussed below.

New ROWs for the construction and maintenance of Alternative C would be required to support the proposed project. Existing construction access trails would be used where possible; however, additional easements for these construction access trails would be needed. Basin Electric would pay market value to non-federal landowners, as established through the appraisal process, for any new land rights necessary to support Alternative C. The appraisal process considers all factors affecting land value, including the impact of transmission lines on property value. The appraisals may reference studies conducted on similar properties to support their conclusions. The strength of any appraisal depends on the individual analysis of the property, using neighborhood-specific market data in order to determine market value.

The impact of introducing a new ROW for transmission structures and lines can vary dramatically depending on the placement of the ROW in relation to the property's size, shape, and location of existing structures. A transmission line may diminish the utility of a portion of property if the line effectively severs this area from the remaining property and subsequently alters existing land use patterns. These factors as well as any other elements unique to the property are taken into consideration to determine any loss in value within the easement area, as well as outside the easement area in cases of severance.

Whenever land use changes, the concern is often raised about the effect the change may have on property values nearby. The question of whether nearby transmission lines can affect residential property values has been studied extensively in the United States and Canada over the last 20 years or so, with mixed results. In general, the impacts are difficult to measure, vary among individual properties, and are influenced by a number of interplaying factors, including:

- Proximity of residential properties to transmission line structures
- Type and size of high-voltage transmission line structures
- Appearance of easement landscaping
- Surrounding topography (Jackson and Pitts, 2010)

Pitts and Jackson (2007) summarize the following conclusions on the impacts of high-voltage transmission lines.

- When negative impacts are present, studies report an average decline of prices from 1 to 10 percent.
- Value diminution is attributable to the visual unattractiveness of the lines, potential health hazards, disturbing sounds, and safety concerns.
- Where property value impacts were present, the effect dissipated with time and distance.
- Property value impacts diminish as the distance between the high-voltage transmission lines and the affected properties increase, and generally disappear completely at a distance of 200 feet from the lines.
- Where views of transmission lines and towers are completely unobstructed, negative impacts can extend up to 0.25 mile.
- If high-voltage transmission-line structures are at least partially screened from view by trees, landscaping, or topography, any negative effects are reduced considerably.
- Value diminution attributed to high-voltage transmission-line proximity is temporary and usually decreases over time, disappearing completely in 4 to 10 years.

A recent study of sales of rural land parcels in central Wisconsin between 2002 and 2008 found small, but not statistically significant negative price effects on the sale of properties encumbered by a transmission line easement (Jackson, 2010). A study by J.A. Chalmers, Ph.D. analyzed nearly 600 miles of a 500-kV transmission line stretching across Montana running from Colstrip in the southeast corner, west to the state border near Taft (Chalmers, 2012a, 2012b, 2012c). Chalmers' research reports on sale dynamics involving properties within 500 feet of the centerline of the Colstrip-Bonneville Power Administration line sold between 2000 and 2010.

With regard to the circumstances that may affect vulnerability to transmission line impacts in rural settings, Chalmers suggests three general principles based on the study of this line:

- When a property's sole use is residential, its vulnerability to price impacts from a transmission line increases.
- As property size increases, vulnerability to negative market impacts from a transmission line decreases.
- If substitutes are available, vulnerability to price impacts and marketing delays can increase.

Although the extent varies, price impacts and market delays associated with the 500-kV line on small rural residential parcels are clearly noted in the Chalmers study. The same report did not find evidence of transmission line impact on sales involving production agricultural properties. A small number of case studies found no impact on the sales of recreationally-influenced agricultural lands due to the presence of the Colstrip-Bonneville Power Administration line.

Studies of impacts during periods of physical change, such as new transmission line construction or structural rebuilds, generally reveal greater short-term impacts than long-term effects. However, most studies have concluded that other factors (e.g., general location, size of property or structure, improvements, irrigation potential, condition, amenities, and supply and demand factors in a specific market area) are far more important criteria than the presence or absence of transmission lines in determining the value of residential real estate.

Some impacts on property values (and salability) might occur on an individual basis as a result of the new transmission line. There are an estimated six residences within 500 feet (1/10th of a mile), and an estimated 52 residences within 0.25 mile of Alternative C. As a result, the introduction of the proposed project is anticipated to result in low adverse effects on property values. These impacts would be highly variable, individualized, and unpredictable. Additionally, reductions in property values associated with reduced agricultural production would be mitigated with compensation for fair market value losses. The majority of these losses would be temporary in nature because property value effects tend to dissipate with time.

The construction, operation, and maintenance of the proposed project would generate additional property tax revenues to counties where the transmission line would be sited. There are approximately 278 miles of transmission lines associated with Alternative C. Table 3-12 summarizes these tax receipts to local governments that would be associated with the transmission line component of the proposed project. There would also be property taxes collected from the substation properties.

Table 3-12: Property Tax Revenues to Project Area Counties Associated with Alternative Route C

	Miles	Year 2	Year 3	Year 4	Years 5-45 (Annual)
Dunn	65	$4,883	$9,765	$14,648	$19,530
McKenzie	125	$9,360	$18,720	$28,080	$37,440
Mercer	19	$1,388	$2,775	$4,163	$5,550
Mountrail	3	$210	$420	$630	$840
Williams	66	$4,943	$9,885	$14,828	$19,770
Project area counties	278	$20,783	$41,565	$62,348	$83,130

Source: Staff calculations based on North Dakota Title 57, Taxation, n.d.

The construction and operation of Alternative C would result in both short- and long-term impacts on agricultural land. During construction, potential short-term impacts within the ROW would include crop damage (depending on the time of year for construction across specific fields), soil disturbance, and potential loss of production for one growing season as a result of construction activities and the transport of construction equipment and vehicles restricting or preventing planting of lands within or adjacent to the ROW. Approximately 1,671 acres of cultivated cropland would be incorporated into the ROW under Alternative C. However, it is unlikely that impacts would occur across the entire 1,671 acres; the majority of impacts would be short term and occur during construction activities. The ROW for Alternative C contains approximately 2,548 acres of grassland and construction activities are expected to have a short-term impact on cattle grazing activities. Cattle may need to be moved during construction activities in areas where the ROW would cross grassland or pasture.

Long-term, direct loss of agricultural land would occur as a result of transmission line structure placement. Lands lost due to the siting of these structures would be approximately 1.4 acres. Therefore, permanent loss of agricultural lands, including cropland, would be less than 1.4 acres. The remaining acreage within the ROW would be allowed to return to cropland once construction is complete. Basin Electric has a policy of allowing agricultural practices within its ROW as long as they do not interfere with or jeopardize the operation of its lines.

Rapid oil and gas development is currently occurring in western North Dakota with an estimated 1,100 to 2,700 new wells expected per year, and 26,000 new wells expected over the next 10 to 20 years (North Dakota Department of Mineral Resources [NDDMR], 2011). Alternative C would support this development by providing electric power that will help accommodate increasing population, businesses, housing, infrastructure, retail stores, and public services. The location of the development of new wells would be constrained by the ROW, although the impacts would be low since the extraction of oil and gas can usually occur from multiple locations within and above the oil reserves.

Impacts associated with the construction of Alternative C are anticipated to be short term, and would cease once the line is in service. Existing public health and safety services such as police, fire, ambulance, and hospital services are already experiencing some deficiencies and personnel shortages due to rapid growth across the region, particularly in smaller communities that have not experienced significant population growth in recent years. This coupled with the inherent potential for accidents and injuries associated with industrial development has added to the increased need for health services. Additional workers moving into the region during construction of the proposed project, if only temporarily, may increase the burden on some or all of the existing public service providers. Impacts on emergency services would be expected to be low with the introduction of an additional 200 people temporarily in the area to support construction of the proposed project. However, with the current deficiencies, the impacts could be higher.

Because of the temporary nature of construction activities, few to no families are expected to accompany construction workers to the project area. As a result, there would be negligible impacts on schools and enrollment.

Alternative C would provide an increase in the load-serving capacity to accommodate the long-term electrical needs of the northwest North Dakota region. Projected load growth would be accommodated and the reliability of the regional transmission system would be maintained, continuing to serve the electricity needs of the area and make the region attractive for additional growth and development opportunities.

Capital expenditures for improvements to electric-utility infrastructure are investments made to serve customers. Basin Electric's customers primarily include 134 member rural electric systems, located in nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming. Capital expenditures can be passed on to customers in the form of increased rates. However, as a regulated utility, Basin Electric can increase rates only on approval by state utility commissions or FERC. FERC and state utility commissions must approve rates for sale of wholesale electricity and review rates set by the federal Power Marketing Administrations. Such rate-increase requests are subjected to rigorous analysis by regulators and others as well as a public process. At this time, not all costs for development of the proposed project are known; therefore, Basin Electric cannot project what the rate increase may be as a result of this project.

In addition to electrical support for the area, project construction would itself generate a certain amount of economic activity. While minimal when compared to the current sales throughout the region, the presence of approximately 200 construction workers over a 2-year period would generate additional sales of food, fuel, lodging, and services (primarily vehicle and equipment repairs). Construction activity would also require concrete, aggregate, lumber, and hardware items. Many of these materials would likely be purchased locally, contributing further to local sales. Most materials for the transmission structures and conductors would be shipped from manufacturers outside the region. However, many of these materials would be subject to sales and subsequent property taxes payable to local jurisdictions that would benefit local programs such as roads and schools.

Alternative C would not influence long-term employment in the project area. Non-resident construction workers would spend a portion of their earnings in the project area, contributing to jobs and income across the region. Because these workers will only be in the area temporarily and are likely to be primarily from outside the region, induced employment and income is expected to be short term and low. No long-term employment would be necessary to support the operation of the proposed project. The local population would increase temporarily, with low and short-term impacts on socioeconomic conditions.

Alternative D

Under Alternative D, potential socioeconomic impacts on the regional economy and employment would be similar to those described under Alternative C. However, there would be some small differences, which are discussed below.

Approximately 150 annual construction jobs would occur over the 2-year life of construction activities, providing a short-term influx of income to the area (Basin Electric, 2012a). This is fewer than the 200 annual workers necessary to support the construction of Alternative C. Under Alternative D, there would be three crews of 50 workers. Because the construction of transmission lines requires specialized expertise and workforce, it is anticipated that the majority of transmission line construction contractors and workers would temporarily relocate to the project area. A small number of local construction workers could be used for more general activities. However, it is anticipated that all of the construction workforce would come from outside of the region. Few workers would be hired locally and permanent jobs are not anticipated to be introduced to the area. No additional employment from the operation of the proposed project is anticipated (Basin Electric, 2012a).

Although construction would occur over 2 years, individual crews may be required for only a few months in a particular construction area before moving to another area on a subsequent phase of the project. Given the length of the proposed project, construction activities would not be confined to one area or community. Workers would be spread out over approximately 251 miles in three crews of approximately 50 workers each, for a total of 150 workers. Earnings of 150 construction workers would be approximately $9.4 million annually, based on average earnings for construction jobs in project area counties (U.S. Department of Commerce, Bureau of Economic Analysis, 2012b, 2012c, 2012d).[5] These earnings represent 0.4 percent of the earnings within project area counties, which were $2.3 billion in 2010 (U.S. Department of Commerce, Bureau of Economic Analysis, 2012d).

Some impacts on property values (and salability) might occur on an individual basis as a result of the new transmission line. There are an estimated five residences within 500 feet (1/10th of a mile), and an estimated 44 residences within 0.25 mile of Alternative D. Therefore, low adverse effects to property values associated with the proposed project are anticipated. These impacts would be highly variable, individualized, and unpredictable. Additionally, reductions in property values associated with reduced agricultural production would be mitigated with compensation for fair market value losses. The majority of these losses would be short-term because most property value effects tend to dissipate with time.

The construction, operation, and maintenance of the proposed project would generate additional property taxes to counties where the line would be sited. There are approximately 251 miles of transmission lines associated with Alternative D. Table 3-13 summarizes the tax receipts to local governments associated with the transmission line. Property tax revenues would also be collected from the substation properties.

Table 3-13: Property Tax Revenues to Project Area Counties Associated with Alternative Route D

	Miles	Year 2	Year 3	Year 4	Years 5-45 (Annual)
Dunn	89	**$6,660**	**$13,320**	**$19,980**	**$26,640**
McKenzie	74	$5,528	$11,055	$16,583	$22,110
Mercer	19	$1,388	$2,775	$4,163	$5,550
Mountrail	3	$210	$420	$630	$840
Williams	66	$4,943	$9,885	$14,828	$19,770
Project area counties	251	**$18,728**	**$37,455**	**$56,183**	**$74,910**

Source: Staff calculations based on North Dakota Title 57, Taxation, n.d.

[5] Average earnings for construction workers of $62,667 in 2010 was based on data available for McKenzie, Mercer, and Williams counties. Construction earnings or employment was not disclosed for Mountrail and Dunn counties.

Construction and operation of Alternative D would result in both short- and long-term impacts on agricultural land. During construction, potential temporary impacts within the ROW would include crop damage (depending on the time of year of construction across specific parcels), soil disturbance, and potential loss of production for one growing season as a result of construction activities and the transport of construction equipment and vehicles restricting or preventing planting of lands within or adjacent to the ROW. Approximately 1,505 acres of cultivated cropland would be incorporated into the ROW under Alternative D. However, it is not anticipated that impacts would occur across the entire 1,505 acres. The majority of impacts would be short term, occurring during construction activities. Approximately 2,408 acres of grassland occur within the ROW for Alternative D and construction activities are expected to have a temporary impact on cattle grazing activities. Cattle may need to be moved temporarily during construction in areas where the ROW would cross grassland or pasture.

Long-term, direct loss of agricultural land would occur as a result of transmission line structure placement. Lands lost for the structure locations necessary for Alternative D would be approximately 1.3 acres. Therefore, permanent loss of agricultural lands, including cropland, would be less than 1.3 acres. The remaining acreage within the ROW would be allowed to return to cropland when construction is completed. Basin Electric has a policy of allowing agricultural practices within its ROW as long as they do not interfere with, or jeopardize, the operation of its lines.

Similar to Alternative C, Alternative D would not influence resident employment in the project area, and no long-term employees would be needed for the operation of the transmission line. The local population would increase temporarily, with low and short-term impacts on socioeconomic conditions.

Alternative E

Similar to Alternative D, 150 annual construction jobs would occur over the life of construction activities, providing a short-term influx of income to the area (Basin Electric, 2012a). Because this alternative includes the construction of two parallel transmission lines, it is anticipated that the three crews of 50 workers would construct both lines at the same time. As a result, the construction period at specific locations along the line may be longer than under Alternative D. Economic benefits that would be recognized from this short-term increase in employment and income are further discussed under Alternative D.

Some impacts on property values (and salability) might occur on an individual basis as a result of the new transmission line. There are an estimated six residences within 500 feet (1/10th of a mile), and an estimated 45 residences within 0.25 mile of Alternative E. Therefore, low adverse effects to property values associated with the proposed project are anticipated. These impacts would be highly variable, individualized, and unpredictable. Additionally, reductions in property values associated with reduced agricultural production would be mitigated with compensation for fair market value losses. The majority of these losses would be short-term because property value effects tend to dissipate with time.

The construction, operation, and maintenance of the proposed project would generate additional property taxes to counties where the line would be sited. There are approximately 314 miles of transmission lines associated with Alternative E. Table 3-14 summarizes the tax receipts to local governments associated with the transmission line. Property tax revenues would also be collected from the substation properties.

Construction and operation of Alternative E would result in both short- and long-term impacts on agricultural land. During construction, potential temporary impacts within the ROW would include crop damage (depending on the time of year of construction across specific parcels), soil disturbance, and potential loss of production for one growing season as a result of construction activities and the transport of construction equipment and vehicles restricting or preventing planting of lands within or adjacent to the ROW. Approximately 1,720 acres of cultivated cropland would be incorporated into the ROW under Alternative E. However, it is not anticipated that impacts would occur across the entire 1,720 acres. The majority of impacts would be short term, occurring during construction activities. Approximately 3,155 acres of grassland occur within the ROW for Alternative E and construction activities are expected to have a temporary impact on cattle grazing activities. Cattle may need to be moved temporarily during construction in areas where the ROW would cross grassland or pasture.

Table 3-14: Property Tax Revenues to Project Area Counties Associated with Alternative Route E

	Miles	Year 2	Year 3	Year 4	Years 5-45 (Annual)
Dunn	111	**$8,303**	**$16,605**	**$24,908**	**$33,210**
McKenzie	115	$8,573	$17,145	$25,718	$34,290
Mercer	19	$1,388	$2,775	$4,163	$5,550
Mountrail	3	$210	$420	$630	$840
Williams	66	$4,943	$9,885	$14,828	$19,770
Project Area Counties	314	**$23,415**	**$46,830**	**$70,245**	**$93,660**

Source: Staff calculations based on North Dakota Title 57, Taxation, n.d.

Long-term, direct loss of agricultural land would occur as a result of transmission line structure placement. Lands lost for the structure locations necessary for Alternative E would be approximately 1.6 acres. Therefore, permanent loss of agricultural lands, including cropland, would be less than 1.6 acres. The remaining acreage within the ROW would be allowed to return to cropland when construction is completed. Basin Electric has a policy of allowing agricultural practices within its ROW as long as they do not interfere with, or jeopardize, the operation of its lines.

Similar to Alternatives C and D, Alternative E would not influence residential employment in the project area, and no long-term employees would be needed for the operation of the transmission line. The local population would increase temporarily, with low and short-term impacts on socioeconomic conditions.

3.9 ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, and other guidelines pertaining to environmental justice are described in the DEIS on pages 3-161 and 3-162.

3.9.1 Affected Environment

The complete affected environment text for Environmental Justice can be found in the DEIS in Section 3.9.1, Affected Environment, on pages 3-162 through 3-164.

3.9.2 Direct and Indirect Effects

For purposes of this analysis, the threshold for an environmental justice minority area is that the area under analysis comprises minority populations more than 10 percent greater than the benchmark or reference region; in this case, the reference or benchmark geographic area is the county and the state. The presence of minority populations is identified on the census block, the smallest geographic area for which the U.S. Census Bureau reports data. Definitions for duration and intensity of impacts to environmental justice communities established for this project are described in Table 3-43 of the DEIS on page 3-165.

The U.S. Census Bureau defines a poverty area as a census tract or other area where at least 20 percent of residents are below the poverty level (U.S. Census Bureau, 2010a).

No-action Alternative

Under the no-action alternative, the proposed project would not be constructed, and there would be no impacts on minority and/or low-income populations as a result of the proposed project.

Alternative C

Minority populations have been identified in the project area in ten census blocks within 0.5 miles from Alternative C. However, low-income populations have not been identified in census tracks adjacent to the proposed project. Because potential environmental justice populations of concern exist, it is necessary to (1) identify any impacts of the project and (2) examine the spatial distribution of any impact areas to determine if these impacts are likely to fall disproportionately on the minority populations.

There are an estimated 52 residences located within 0.25 mile of Alternative C, of which 7 are located in census blocks that have been identified as having relatively higher proportions of minority residents. Six of the residences are in Williams County; two are 3 miles north of Springbrook, and four are west of Williston. An additional house is located in McKenzie County approximately 12 miles north of the community of Grassy Butte.

Alternative C is expected to contribute positively to potential environmental justice communities through additional fiscal receipts to counties. However, these populations also could be adversely affected by potential project-induced impacts on additional resource areas (e.g., traffic, air quality, visual resources, and agricultural land uses). Air quality and traffic impacts are anticipated to be short term with air emission dispersion limited to the vicinity of construction activities. Following construction, impacts would primarily be limited to land use restrictions within the ROW and the presence of the transmission line and structures on properties. It is possible these residents may experience adverse visual impacts; however, there are 45 additional residences within a 0.25-mile buffer that also would experience some adverse effects. Therefore, these potential environmental justice populations are not anticipated to be disproportionately affected by these impacts.

The vast majority of land use within the ROW is rangeland and cultivated croplands. There may be some minor impacts on agricultural activities, although these are primarily short-term effects and are not anticipated to fall disproportionately on environmental justice populations. Additionally, there would be negligible to minimal effects on property values, because only six residential structures fall within 0.1 mile (approximately 500 feet) of the transmission line route within the census blocks identified as having relatively higher proportions of minority residents.

Alternative C would not have any disproportionate adverse impacts on minority and low-income communities.

Alternative D

Minority populations have been identified in the project area in eight census blocks within 0.5 mile from Alternative D. However, low-income populations have not been identified in census tracks adjacent to Alternative D. Because potential environmental justice populations of concern exist, it is necessary to (1) identify any impacts of the project and (2) examine the spatial distribution of any impact areas to determine if these impacts are likely to fall disproportionately on the minority populations.

There are an estimated 44 residences located within 0.25 mile of Alternative D; 6 of which are located in census blocks that have been identified as a potential minority environmental justice population. All of the residences are in Williams County; two are 3 miles north of Springbrook, and four are west of Williston.

Similar to Alternative C, Alternative D is anticipated to contribute positively to potential environmental justice communities through additional fiscal receipts to counties. However, these populations also could be adversely affected by the potential project-induced impacts on additional resource areas (e.g., traffic, air quality, visual resources, and agricultural land uses). Air quality and traffic impacts are anticipated to be short term with air emission dispersion limited to the vicinity of construction activities. Once construction is complete, impacts would be primarily limited to land use restrictions within the ROW and the presence of the transmission line and structures on properties. It is possible these residents may experience adverse visual impacts; however, there are 38 additional residences within 0.25 mile of the proposed transmission line centerline that also would experience some adverse effects. Therefore, potential environmental justice populations in the project area are not expected to be disproportionately affected by these impacts.

The majority of land use within the ROW is rangeland and cultivated croplands. There may be some minor impacts on agricultural activities, although these are primarily short-term and are not anticipated to fall disproportionately on environmental justice populations. Additionally, there would be negligible to minimal effects on property values, because only five residential structures fall within 0.1 mile (approximately 500 feet) of the transmission line route and within census blocks identified as having relatively higher proportions of minority residents.

Alternative D would not have any disproportionate adverse impacts on minority and/or low-income communities.

Alternative E

Minority populations have been identified in the project area in eight census blocks within 0.5 mile from Alternative E. However, low-income populations have not been identified in census tracks adjacent to Alternative E. Because potential environmental justice populations of concern exist, it is necessary to (1) identify any impacts of the project and (2) examine the spatial distribution of any impact areas to determine if these impacts are likely to fall disproportionately on the minority populations.

There are an estimated 45 residences located within 0.25 mile of Alternative E; 6 of which are located in census blocks that have been identified as a potential minority environmental justice population. All of the residences are in Williams County; two are 3 miles north of Springbrook, and four are west of Williston.

Similar to Alternatives C and D, Alternative E is anticipated to contribute positively to potential environmental justice communities through additional fiscal receipts to counties. However, these populations also could be adversely affected by the potential project-induced impacts on additional resource areas (e.g., traffic, air quality, visual resources, and agricultural land uses). Air quality and traffic impacts are anticipated to be short term with air emission dispersion limited to the vicinity of construction activities. Once construction is complete, impacts would be primarily limited to land use restrictions within the ROW and the presence of the transmission line and structures on properties. It is possible these residents may experience adverse visual impacts; however, there are 39 additional residences within 0.25 miles of the proposed transmission line centerline that also would experience some adverse effects. Therefore, potential environmental justice populations in the project area are not expected to be disproportionately affected by these impacts.

The majority of land use within the ROW is rangeland and cultivated croplands. There may be some minor impacts on agricultural activities, although these are primarily short-term and are not anticipated to fall disproportionately on environmental justice populations. Additionally, there would be negligible to minimal effects on property values as only six residential structure falls within 0.1 mile (approximately 500 feet) of the transmission line route and within census blocks identified with high concentrations of minority residents.

Alternative E would not have any disproportionate adverse impacts on minority and/or low-income communities.

3.10 RECREATION AND TOURISM

3.10.1 Affected Environment

The complete affected environment text for Recreation and Tourism can be found in the DEIS in Section 3.10.1, Affected Environment, on pages 3-166 through 3-170.

3.10.2 Direct and Indirect Effects

This section discusses potential impacts, their duration, and intensity on recreation and tourism resulting from construction and operation of the proposed project, including the no-action alternative. Definitions for duration and intensity are described in Table 3-44 of the DEIS on page 3-170.

No-action Alternative

Under the no-action alternative the proposed project would not be constructed, and there would be no impacts on recreation or tourism as a result of the project.

Alternative C

The majority of the land crossed by Alternative C is privately owned. Possible impacts on recreational users on private lands would include noise from construction, construction vehicles, equipment and workers, dust from construction activities, access restrictions, and wildlife disruption. However, due to the length of construction-related disturbances, Alternative C would have short-term, low impacts on recreational opportunities such as hunting, fishing, boating, hiking, OHV use, and camping on private lands. In the long term, conversion of 73 acres of private land for the substations and switchyards would remove it from further land use, including recreational use. However, given the relatively small area of land to be occupied by the substation and switchyard facilities, there would be no overall impacts on these recreational opportunities.

Alternative C would span the Missouri River at the head of Lake Sakakawea near Williston. The crossing would be adjacent to the existing U.S. Highway 85 within a utility corridor containing an existing Western transmission line and a rural water pipeline, which currently results in generally limited use of these lands for recreation. The Missouri River crossing would be located approximately 20 miles west of Lewis and Clark State Park, and would have no impacts on recreation associated with the park. Alternative C would pass within approximately 2 miles of Lake Ilo National Wildlife Refuge in Dunn County at its closest point and would be expected to have no impact on the refuge.

Alternative C would cross approximately 57.9 acres of USACE property in the area of the proposed Missouri River crossing, which is part of the Lewis and Clark WMA managed by NDGFD. This is the only WMA that is directly crossed by the Alternative C. Possible impacts on recreational users would include noise from construction, construction vehicles, equipment and workers, dust from construction activities, access restrictions, and wildlife disruption. As discussed above, low to no impacts to the WMA would be expected because the line would be immediately parallel to U.S. Highway 85 in an area not heavily used for recreation.

The ROW for Alternative C would not cross BLM lands. The western segment of the ROW would be located within approximately 200 feet of one BLM parcel but would have no impacts on recreation on BLM lands.

The western segment of Alternative C would be constructed east of the TRNP-North Unit. At its closest point, the transmission line ROW would be about 1.5 miles from the park. Potential impacts on recreational users accessing the TRNP-North Unit would include traffic delays or temporary road closures related to construction activity; however, these impacts would be short term, localized, and limited to the construction phase of the project. Alternative C would have no direct impacts on recreational use the TRNP-North Unit in either the short or long term.

The western segment would incorporate approximately 152.9 acres of the LMNG into the utility ROW (See Section 3.7 of the DEIS, Land Use). During construction, these lands may have temporary access restrictions for LMNG users to provide for public safety. The western segment of Alternative C would not be located within any management areas designated as Roadless, but would immediately parallel the western edge of the Lone Butte Management Area and would lie within approximately 500 feet of the Long X Divide Management Area. The western segment would cross the Lewis and Clark National Historic Trail in the vicinity of U.S. Highway 85 and would also pass within approximately 0.5 mile of one USFS campground (Summit Campground), located adjacent to U.S. Highway 85 approximately 3.5 miles south of TRNP. Noise from construction, construction vehicles, equipment and workers, and dust from construction activities could potentially disturb recreational users at the Summit campground. The construction of the proposed transmission line could result in temporary traffic delays and road closures along U.S. Highway 85 that would temporarily diminish access to the campground. Overall, project construction would have short-term, low impacts on recreational facilities in LMNG. Following any construction-related disturbance, access to recreational facilities would return to normal. Construction-related noise could also disrupt dispersed recreational activities such as hunting in the short term. Similar to recreational facilities as described above, access to dispersed recreational opportunities would be expected to return to pre-project conditions following completion of construction. No other impacts on recreation on the LMNG are expected. The western segment of Alternative C would cross the Little Missouri River in McKenzie County, in the vicinity of the U.S. Highway 85 crossing approximately 19 miles west of Little Missouri State Park. The river would continue to be available for recreation at the transmission line crossing.

The eastern segment of Alternative C would be located more than 17 miles east of TRNP at its closest point. This segment of the ROW would incorporate approximately 57.9 acres of the LMNG into utility ROW (see Section 3.7 of the DEIS, Land Use). During construction, these lands may have temporary access restrictions for LMNG users to provide for the safety of the public. The eastern segment of Alternative C would not be located within any management areas designated as Roadless, nor would it pass within close proximity to any public recreational facilities. Alternative C would therefore have no impacts on recreation on LMNG lands. It would cross the Little Missouri River in Dunn County, north of Killdeer and approximately 5 miles west of Little Missouri State Park.

Alternative D

Similar to Alternative C, the majority of the land crossed by Alternative D is privately owned and possible impacts on recreational users on private lands would include noise from construction, construction vehicles, equipment and workers, dust from construction activities, and wildlife disruption. Impacts from Alternative D would be low in the short term. In the long term, conversion of 85 acres of private land for the substations and switchyards would remove it from further land use, including recreational use. However, given the relatively small area of land to be occupied by the substation and switchyard facilities, there would be no overall long-term impacts on recreation on private lands.

Under Alternative D, the proposed transmission line would be located more than 17 miles east of TRNP at its closest point. It would incorporate approximately 57 acres of the LMNG into utility ROW (see Section 3.7, Land Use). Alternative D would not be located within any management areas designated as Roadless, nor would it pass within close proximity to any campgrounds or other developed recreational facilities on the LMNG. Construction phase impacts associated with Alternative D would be similar to those described for Alternative C and would be low. Alternative D would have no long-term impacts on recreation on LMNG lands.

Under Alternative D, the proposed transmission line would not cross or pass near BLM lands. Alternative D would therefore have no impacts on recreation on BLM lands. Alternative D would cross the Little Missouri River in Dunn County, north of Killdeer and approximately 5 miles west of Little Missouri State Park. Similar to Alternative C, Alternative D would cross the Lewis and Clark National Historic Trail in the vicinity of U.S. Highway 85, and would span the Missouri River at the head of Lake Sakakawea near Williston. The crossing would be adjacent to the existing U.S. Highway 85 within a utility corridor containing an existing Western transmission line and a rural water pipeline, which currently results in generally limited use of these lands for recreation. No impacts on recreation would thus be expected at the Missouri River crossing. The crossing is approximately 20 miles west of Lewis and Clark State Park and therefore would have no impacts on recreational facilities or use associated with the park.

Alternative E

Similar to Alternatives C and D, the majority of the land crossed by Alternative E is privately owned and therefore recreational users on private lands would experience similar impacts to those described above. Impacts from Alternative E would be low in the short term. In the long term, conversion of 85 acres of private land for the substations and switchyards would remove it from further land use, including recreational use. However, given the relatively small area of land to be occupied by the substation and switchyard facilities, there would be no overall long-term impacts on recreation on private lands.

Under Alternative E, as with Alternative D, the proposed transmission line would be located more than 17 miles east of TRNP at its closest point. It would incorporate approximately 57 acres of the LMNG into utility ROW (see Section 3.7, Land Use). Alternative E would not be located within any management areas designated as Roadless, nor would it pass within close proximity to any campgrounds or other developed recreational facilities on LMNG. Impacts from Alternative E on LMNG lands would be identical to those described for Alternative D.

Under Alternative E, the proposed transmission line would not cross or pass near BLM lands, and would therefore have no impacts on recreation on BLM lands. Alternative E would cross the Little Missouri River in Dunn County, north of Killdeer and approximately 5 miles west of Little Missouri State Park. Similar to both Alternatives C and D, Alternative E would cross the Lewis and Clark National Historic Trail in the vicinity of U.S. Highway 85 and would span the Missouri River at the head of Lake Sakakawea near Williston adjacent to the existing U.S. Highway No impacts to recreation would thus be expected at the Missouri River crossing. The crossing is approximately 20 miles west of Lewis and Clark State Park and therefore would have no impacts on recreational facilities or use associated with the park.

3.11 INFRASTRUCTURE AND TRANSPORTATION

3.11.1 Affected Environment

The complete affected environment text for Infrastructure and Transportation can be found in the DEIS in Section 3.11.1, Affected Environment, on pages 3-172 through 3-188.

3.11.2 Direct and Indirect Effects

This section discusses potential impacts, their duration, and intensity on infrastructure and transportation resulting from the construction and operation of the proposed project alternatives, including the no-action alternative. Definitions for duration and intensity developed for this project are described in Table 3-51 of the DEIS on page 3-189.

No-action Alternative

<u>Utility Infrastructure</u>

Under the no-action alternative, no new transmission infrastructure would be constructed. Based on previous studies, the existing transmission network in the project area is not capable of handling anticipated future load projections. The IS report *Eastern Montana/Western North Dakota Load Serving Study Facilities Additions Justification* (IS, 2011) estimates that if improvements are not made to the existing electrical system and with the significant and projected further increase of the oil and gas industry, significant system failures, including considerable voltage drops or even voltage collapse, could occur. This would potentially result in adverse impacts, such as brownouts and other related issues.

<u>Transportation Infrastructure</u>

No construction activities would be associated with the no-action alternative and the proposed project would not occur. However, traffic volumes are anticipated to continue to increase in areas where the oil and gas industry is growing. Without construction of the proposed project, electrical equipment used for oil and gas production, such as compressors and pumps for transmission of oil and gas through supply pipelines, could be limited by lack of reliable electrical service. If these transmission pipelines are not used, oil and gas would need to be transported by truck from the area, increasing heavy truck volumes on local and regional roadways or railroad. Additional truck volumes, particularly those of considerable weight, such as those vehicles moving oil and gas, would lead to increased wear on roads, slow traffic, and/or result in increased safety concerns for motorists.

Roadway improvements, both directly and indirectly associated with the projected increase in the oil and gas industry planned for project area counties, are discussed in more detail in Chapter 4.

Alternative C

Utility Infrastructure

Alternative C would cross a variety of other utility infrastructure in the project area, including oil, gas, water, and other electric facilities. Prior to construction activities, Basin Electric would identify all utilities that Alternative C would cross and work with other utility companies and affected municipalities to ensure protection of these facilities during the construction period. It may be necessary to take existing utility facilities, particularly electric lines, out of service when construction of the proposed project would traverse supporting infrastructure. However, any service outages would be closely coordinated with the owning utility to ensure continued customer service and safety. Should any interruptions in service occur, they would be short term and timed to create minimal inconvenience, such as during cooler periods when residents and businesses are less likely to be using air conditioning. No long-term impacts on existing utility infrastructure are anticipated.

Transportation Infrastructure

During the construction of Alternative C, short-term impacts on the transportation network may result. The movement of heavy material haul trucks and greater vehicular volumes would increase wear on affected roadways. Basin Electric would be responsible for any improvements or repairs to damaged roads as a result of construction activities. As Alternative C is further refined, Basin Electric would work with the appropriate entities and municipal officials to minimize potential adverse impacts by identifying material haul routes, limitations, and improvements associated with the road network.

Long-term impacts on roadways, railroads, and airports and airstrips in the project area are not anticipated as a result of Alternative C. All crossings of linear infrastructure would be in compliance with NESC clearance requirements. Basin Electric would coordinate with and obtain all necessary permits and/or approvals from the Federal Aviation Administration (FAA) and for road and rail line crossings. Once in operation, there would be periodic maintenance of the transmission line and supporting facilities; however, such activities are not anticipated to adversely affect roadway traffic patterns or volumes. No long-term impacts on railroads or airports or airstrips are anticipated.

<u>Roadways</u>

The alignment of Alternative C diverges into two segments between Killdeer and Watford City and the Charlie Creek Substation and Watford City. Potential short-term impacts on traffic patterns in those areas where Alternative C is located, generally east of the Charlie Creek Substation and north and west of Watford City, are presented below. In this portion of the project area, Alternative C would cross or come near primary roadways, including:

- ND State Highway 8, just south of where it meets ND State Highway 1806
- ND State Highway 22, north of Killdeer
- ND State Highway 200, east of the U.S. Highway 85 intersection near Charlie Creek Substation
- U.S. Highway 85, two locations south of Williston
- U.S. Highway 2, west where it meets U.S. Highway 85 in Williston
- U.S. Highway 85, north of U.S. Highway 2 and northeast of Williston
- U.S. Highway 2, north of Williston
- ND State Highway 1806, just south of U.S. Highway 2 and south of Tioga

Alternative C would also cross numerous collector roads; some of which are unpaved or graveled and have already experienced notable increases in traffic volumes as a result of growth in the oil and gas industry.

Construction activities associated with Alternative C would result in short-term impacts on the roadway network in areas where road and lane closures and traffic detours may be necessary during specified periods. The extent of these impacts would depend on the location of road and lane closures, traffic detours, and their duration.

As described in the affected environment (Section 3.11.1 of DEIS), some roadways in the project area have experienced a significant increase in vehicular volumes, particularly heavy trucks, with the growth of the oil and gas industry. Because of high truck volumes and private vehicle trips on certain roadways, any temporary disturbance to traffic patterns would be experienced beyond areas where construction activities are taking place. As Alternative C is further refined, Basin Electric would work to ensure that closures and detours are minimized to the greatest extent possible. Basin Electric would coordinate with affected municipalities and appropriate entities (i.e., North Dakota Department of Transportation) to develop a construction action plan to minimize short-term, adverse effects.

Closures and detours may be necessary to string transmission lines across roads. Temporary traffic delays may occur as a result of the movement of heavy material haul trucks. Longer traffic delays would occur on higher volume roadways. Roadway closures would be planned in advance and timed during off-peak travel times to minimize adverse effects. Appropriate notification would be posted in and around affected areas to inform motorists of planned closures and detours. However, moderate to high short-term impacts on traffic patterns are anticipated during this time.

Maintenance activities associated with the transmission line would occur primarily within the proposed project ROW and avoid disrupting traffic patterns. While maintenance vehicles would need to access locations where repairs or other activities are necessary, the movement of these vehicles would not occur on a regular basis and are not anticipated to adversely affect traffic patterns over the long term.

Along the West Segment, the proposed project alignment would run from the Charlie Creek Substation in the south to the proposed Blue Substation, northwest of Watford City. Roadways that the West Segment would cross or come within immediate proximity to and potentially affect vehicular movements include:

- U.S. Highway 85, just south of the Little Missouri River Crossing
- U.S. Highway 85, south of Watford City
- ND State Highway 23, west of U.S. Highway 85 and Watford City

Collector roads, some of which are unpaved or graveled, may be crossed by the West Segment. Potential short- and long-term impacts from road and lane closures and traffic detours would be the same as those described above. Similar mitigation measures would apply.

The East Segment would travel north from the proposed Red Switchyard in Killdeer to meet the West Segment at the proposed Blue Substation, northwest of Watford City. Between these locations, the East Segment would cross or come relatively near the following primary roadways:

- ND State Highway 22 at two locations south of Little Missouri State Park and north of ND State Highway 200
- ND State Highways 23 and 73, east of ND State Highway 1806
- ND State Highway 1806, north of ND State Highway 23

Collector roads, some of which are unpaved or graveled, may be crossed by the East Segment. Potential short- and long-term impacts from road and lane closures and detours would be the same as those described above. Similar mitigation measures would apply.

Railroads

Existing active railroad tracks are located in the northern and southern portion of the project area where Alternative C would run along one alignment. Alternative C would cross over active railroad tracks in three locations in the northern portion of the project area. These crossings would be located near Williston, Ray, and Tioga.

BNSF Railway Company (BNSF) has developed a utility accommodation policy that addresses new utility installations that parallel or cross BNSF railroad lines. According to this policy, utility lines should be located to avoid or minimize the need for adjustments for future railroad improvements and to permit access to the utility lines for their maintenance with minimum interference to railroad traffic.

Authorization from BNSF would be required should construction activities enter the BNSF ROW. In areas where construction of Alternative C would cross BNSF track, rail traffic may need to be temporarily stopped or rerouted resulting in a disruption to BNSF freight movements or Amtrak trains that use these tracks. Because this would occur at few locations and construction activities could likely be timed to avoid train movements, no short-term impacts are anticipated. Basin Electric would coordinate such activities with BNSF and Amtrak.

As Alternative C is further refined, Basin Electric would work to ensure that project design and construction activities minimize or avoid electrical interference with the railroad. These activities would be conducted in accordance with BNSF's Utility Accommodation Policy (Engineering Services, 2011).

Once in operation, maintenance activities associated with Alternative C would be timed to avoid rail traffic. The project would be designed to encompass adequate structure heights at railroad crossings to minimize potential impacts on railroad maintenance activities. Railroad maintenance crews would need to conduct such activities with caution to avoid contact with the transmission line. It may be necessary to require additional safety precautions and/or employee training, in addition to those that may already be in place, to ensure worker safety. No long-term impacts on railroad operations are anticipated.

The American Railway Engineering and Maintenance-of-Way Association has specifications in place for steady and rail-to-ground and equipment-to-ground voltage levels to ensure the safety of railroad operating personnel and the public. Such specifications would be followed to avoid electrical interference from capacitive, electric and magnetic, and conductive effects (American Railway Engineering and Maintenance-of-Way Association, 2012).

Airports and Airstrips

The proposed project would be located within close proximity to airports and airstrips located in the project area. According to FAA regulations, any proposed structure that does not exceed the obstacle reference line will not be classified as an obstacle. If the proposed structure would penetrate airspace above the obstacle reference line, it would be classified as an obstruction. Should the proposed structure be classified as an obstruction in accordance with provisions set forth in Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace of Title 14 of the CFR, a review would be required to determine if it would constitute a hazard to airspace (FAA, 1993). Requirements and application procedures for making this determination are summarized in the abovementioned regulations. All applications must be submitted at least 45 days prior to the start of construction or alteration activities or the date an application for a construction permit is filed, whichever is earliest (14 CFR 77). CFR 77.19, Civil Airport Imaginary Surfaces, identifies the required obstacle clearances for airports.

The siting of the proposed project would result in an air space obstruction in the vicinity of Sloulin Field International Airport in the city of Williston. Basin Electric would work with the FAA to obtain the necessary approvals to site the proposed project in this area. Additionally, an ongoing study and environmental assessment may result in the airport being relocated to an area nearby to accommodate the significant increase in air traffic, which is largely a result of increased oil and gas production in the area. Should the airport be relocated, no obstruction would result from the proposed project (see Chapter 4, Infrastructure and Transportation). Obstructions at other airports in the study area are not anticipated. Coordination would be initiated as project design progresses.

Alternative D

Alternative D generally follows the same alignment as Alternative C with the exception of the West Segment, which would not be included as part of this alternative. All roadways identified under Alternative C in the northern and southern extremes of the proposed project alignment and the East Segment would also be included under Alternative D. Under Alternative D, the proposed project alignment would cross or come relatively near the following primary roadways:

- ND State Highway 8, just south of where it meets ND State Highway 1806
- ND State Highway 22, north of Killdeer
- ND State Highway 200, east of U.S. Highway 85 intersection near Charlie Creek Substation
- U.S. Highway 85, two locations south of Williston
- U.S. Highway 2, west where it meets U.S. Highway 85 in Williston
- U.S. Highway 85, north of U.S. Highway 2 and northeast of Williston

- U.S. Highway 2, north of Williston
- ND State Highway 1806, just south of U.S. Highway 2 and south of Tioga
- ND State Highway 22, at two locations south of Little Missouri State Park and north of ND State Highway 200
- ND State Highways 23 and 73, east of ND State Highway 1806
- ND State Highway 1806, north of ND State Highway 23

Collector roads, some of which are unpaved or graveled, would be crossed by Alternative D. Potential short- and long-term impacts from road and lane closures and detours would be the same as those described under Alternative C. Similar mitigation measures would apply.

Railroads

Existing active railroad tracks are located in the northern and southern portion of the project area where Alternatives C and D are the same. In the northern portion of the project area, Alternative D would cross over active railroad tracks at the same three locations as Alternative C, near Williston, Ray, and Tioga. The same policies, protocols, and authorizations that apply for crossing active railroad tracks under Alternative C would also be true under Alternative D.

Airports and Airstrips

Similar to Alternative C, the location of the proposed project under Alternative D could result in an air space obstruction in the vicinity of Sloulin Field International Airport in the city of Williston. Basin Electric would work with the FAA to obtain the necessary approvals to site the proposed project in this area. Additionally, an ongoing study and environmental assessment may result in the airport being relocated to an area nearby to accommodate the significant increase in air traffic, which is largely a result of increased oil and gas production in the area. Should the airport be relocated, no obstruction would result from the proposed project (see Chapter 4, Infrastructure and Transportation). Obstructions at other airports in the study area are not anticipated. Coordination would be initiated as project design is further refined. FAA regulations identified under Alternative C would also be implemented under Alternative D.

Alternative E

Because Alternative E would follow the same alignment as Alternative D, but with an increased ROW, potential short- and long-term impacts introduced as a result of the proposed project would be similar to those presented above. No additional impacts beyond those discussed under Alternative D would be anticipated.

3.12 PUBLIC HEALTH AND SAFETY

3.12.1 Affected Environment

The complete affected environment text for Public Health and Safety can be found in the DEIS in Section 3.12.1, Affected Environment, on pages 3-195 through 3-200.

3.12.2 Direct and Indirect Effects

This section discusses potential impacts, their duration, and intensity on public health and safety resulting from the construction and operation of the proposed project, including the no-action alternative. Definitions for duration and intensity associated with public health and safety developed for this project are described in Table 3-52 of the DEIS on page 3-201.

Potential public health and safety impacts that may result under the proposed project alternatives are provided below. The discussion includes potential effects associated with construction activities, increased exposure to electric and magnetic fields (EMFs) in areas within proximity to the proposed project, and operational risks.

No-action Alternative

Under the no-action alternative, the proposed transmission line would not be constructed. As a result, no adverse impacts on public health and safety would result from construction or operational activities or increased exposure to EMFs. Current EMF levels would remain relatively similar to current conditions due to the presence of existing transmission lines and other devices that emit EMFs in the project area.

Alternative C

During construction of the proposed project, heavy equipment would be required and ground surfaces would be disturbed. The use of heavy equipment and other construction-related materials would likely include the use of oil and gas for fueling as well as other potentially hazardous materials. While it is not anticipated at this time, the disturbance of ground materials may reveal the presence of hazardous or potentially hazardous materials.

Direct contact between an object on the ground and an energized conductor poses the most serious risk of injury or death from a high-voltage transmission line. During construction of the proposed project, there would be multiple crossings of existing energized lines, both transmission and distribution, in addition to upgrades to existing substations; however, it is not anticipated that direct contact with energized lines would occur. Additionally, guard structures and matting would be used at crossing locations to protect existing facilities and worker safety. Prior to construction activities, Basin Electric would work with utility owners to coordinate line outages or other mitigation measures to ensure the safe implementation of the proposed project.

Prior to the onset of construction activities, a construction action plan would be prepared. The plan would be prepared in accordance with NESC and the Occupational Safety and Health Administration's regulations, as required by federal law. Additionally, the plan would include prevention and response procedures such as those required in a spill prevention control and countermeasure plan and a stormwater pollution prevention plan under state and federal law.

Workers would be knowledgeable of the protocols in place and required to follow all procedures during construction activities. However, the potential does exist for minor and major injuries to occur during the construction of the proposed project. Such potential exists for all activities where construction and heavy equipment are used.

In order to assess potential impacts associated with an increase in EMFs as a result of the proposed project, the Corona and Field Effects Program was used to calculate and approximate future EMF levels. This model was developed by the Bonneville Power Administration (Bonneville Power Administration, undated). The output from these calculations was used to plot the EMF profiles across distances from the centerline of Alternative C. The ROW is 75 feet from the centerline of the proposed Alternative C. Outputs from the model for Alternative C can be found in Appendix J of the DEIS.

Under Alternative C, electric fields 75 feet from the proposed project alignment would be 0.214 kilovolts per meter (kV/m), well below the International Commission on Non-Ionizing Radiation Protection (ICNIRP) identified level of 4.2 kV/m required to protect the public (ICNIRP, 2010). Magnetic fields at the same distance measured 94 milligauss (mG), also well below the ICNIRP identified level of 2,000 mG necessary to protect the public. These levels are also below those necessary to ensure the continued function of pacemakers and other implantable devices. Therefore, the operation of Alternative C would not result in adverse impacts on public health and safety as a result of the slight increase in EMF levels.

Once in operation, Alternative C has the potential to cause stray voltage. This can occur from a maintenance issue or improperly grounded equipment under the transmission line or at electric service entrances to structures from distribution lines. Transmission lines can induce stray voltage on distribution lines in circumstances where the transmission line is parallel to and directly over the distribution line. If such configurations are created, some farm equipment (barns, fences, gates, etc.) may be subject to developing small electric charges that could be transferred to humans or livestock upon contact with equipment, structures, or facilities. Basin Electric would work to ensure that proper measures are implemented to avoid this to the greatest extent possible. Additionally, should stray voltage concerns be identified following construction activities, Basin Electric would correct the circumstances creating the stray voltage. As a result, no long-term impacts are anticipated.

High-voltage transmission lines are designed to automatically trip or become de-energized should they fall or come into contact with trees. They typically only fall during severe weather events, such as excessive ice or tornados, or if they are struck by a large vehicle. Should Alternative C be located within the vicinity of distribution lines and should a line fall, then the risk of an energized distribution line on the ground would result presenting a safety hazard. Basin Electric would work to ensure that all safety precautions are taken to safely and quickly address any such incidents.

Alternative C includes the installation of several hundred structures to support the current-carrying conductors. Many of these structures would be located in or adjacent to agricultural lands and may create an obstacle for equipment. The operation of farm equipment near proposed structures could result in unnecessary contact and/or damage to machinery and/or operators. As Alternative C is further refined, Basin Electric would work with affected property owners to locate structures in areas that would avoid or have reduced concern for potential impacts on farming and ranching operations.

Over the long term, adverse impacts from the operation of Alternative C are anticipated to be negligible to minor.

Alternative D

Potential public health and safety impacts associated with the construction and operation of Alternative D would be similar to those identified under Alternative C. Similar measures to ensure the safety of construction workers, area residents, and animals under Alternative C, such as the implementation of a construction action plan, coordination with utility owners, and maintenance activities, would also be implemented under Alternative D.

The Corona and Field Effects Program was used to calculate and approximate future EMF levels that would result from the operation of Alternative D. Additional discussion of this model is presented under Alternative C; outputs from the model for Alternative D are shown in Appendix B of this document.

The ROW is 75 feet from the centerline of the proposed project alignment. Under Alternative D, electric fields 75 feet from the proposed project alignment would be 0.268 kV/m, well below the ICNIRP identified level of 4.2 kV/m required to protect the public. Magnetic fields at the same distance measured between 34.24 and 36.97 mG, also well below the ICNIRP identified level of 2,000 mG necessary to protect the public. These levels are also below those necessary to ensure the continued function of pacemakers and other implantable devices. Therefore, the operation of Alternative D would not result in adverse impacts on public health and safety as a result of the slight increase in EMF levels.

Over the long term, adverse impacts from the operation of Alternative D are anticipated to be negligible to minor.

Alternative E

Potential public health and safety impacts associated with the construction and operation of Alternative E would be similar to those identified under Alternative C. Similar measures to ensure the safety of construction workers, area residents, and animals under Alternative C, such as the implementation of a construction action plan, coordination with utility owners, and maintenance activities, would also be implemented under Alternative E.

The Corona and Field Effects Program was used to calculate and approximate future EMF levels that would result from the operation of Alternative E. Additional discussion of this model is presented under Alternative C; outputs from the model for Alternative E are shown in Appendix B of this document.

Because Alternative E includes two transmission lines that would run parallel to each other, the ROW would be larger than under Alternatives C and D—a combined 300 feet. Under Alternative E, electric fields 150 feet from the proposed project alignment would range from between .760 kV/m to 1.396 kV/m, well below the ICNIRP identified level of 4.2 kV/m required to protect the public. Magnetic fields at the same distance measured from between 52.72 mG to 87.43 mG, also well below the ICNIRP identified level of 2,000 mG necessary to protect the public. These levels are also below those necessary to ensure the continued function of pacemakers and other implantable devices. Therefore, the operation of either of the alternative routes would not result in adverse impacts on public health and safety as a result of the slight increase in EMF levels.

Over the long term, adverse impacts from the operation of Alternative E are anticipated to be negligible to minor.

3.13 NOISE

3.13.1 Affected Environment

The complete affected environment text for Noise can be found in the DEIS in Section 3.13.1, Affected Environment, on pages 3-203 through 3-205.

3.13.2 Direct and Indirect Effects

Construction activities associated with the alternatives would generate noise in the project area. Noise levels also may periodically increase during operation and maintenance of the proposed project. This noise would have the potential to affect nearby residences, recreational users, wildlife, and other sensitive receptors.

This section discusses potential impacts, their duration, and intensity on sensitive receptors to noise resulting from construction and operation of the proposed project, including the no-action alternative. Definitions for duration and intensity developed for this project are described in Table 3-53 of the DEIS on page 3-206.

No-action Alternative

Under the no-action alternative, the proposed project would not occur and no construction or construction activities would take place, leading to no impacts on noise.

Alternative C

Noise impacts associated with Alternative C would stem from construction activities and operation and maintenance of the proposed transmission line and associated structures. Construction activities would create intermittent and short-term noise occurring only when such activities are ongoing. Potential sources of noise from construction activities include: construction of foundations at each transmission structure site; transmission structure site preparation; erection of structures at individual tower sites; helicopter assistance during transmission structure erections and stringing of conductors; material and staff vehicle transportation; and construction staff interactions and activities. The structure and site preparation would be completed using conventional construction equipment. Table 3-15 lists equipment likely to be used during construction activities and summarizes noise levels produced by this equipment. Data presented in this table uses L_{eq}, a statistical descriptor that depicts the average sound level for environmental noise and accounts for fluctuating sound levels.

At a distance of 50 feet, the overall combined noise estimate generated by conventional equipment that would likely be used during construction of the proposed project is 89 A-weighted decibels (dBA) L_{eq}. Noise produced by construction activities would decrease with distance at a rate of 6 dBA per doubling distance from the site. Table 3-16 shows estimated construction noise levels at various distances from construction activities based on this rate of decrease.

Table 3-15: Typical Construction Equipment Noise Levels

Type of Equipment	Maximum Level (dBA) at 50 Feet
Road grader	85
Bulldozer	85
Heavy truck	88
Backhoe	80
Pneumatic tools	85
Crane	85
Combined equipment	89

Source: Thalheimer, 1996

Table 3-16: Construction Noise in the Vicinity of a Representative Construction Site

Distance from Construction Site (feet)	Hourly Leq (dBA)
25	95
50	89
100	83
200	77
400	71
800	65
1600	59

Note: The following assumptions were used:

Equipment used: (1) each- grader, bulldozer, heavy truck, backhoe, Pneumatic tools, concrete pump, crane. Reference noise level: 89 dBA (L_{eq}). Distance for the reference noise level: 50 feet. Noise attenuation rate: 6 dBA/doubling. This calculation does not include the effects, if any, of local shielding or atmospheric attenuation.

Noise stemming from construction-related activities would occur at various locations along the proposed Alternative C alignment, but would be primarily limited to those areas where workers are conducting construction activities. However, any increase in noise would only be a concern if sensitive noise receptors (residences, schools, religious institutions, libraries, or other community resources) are located near the proposed project and construction activities to experience increases in noise. The majority of land use in the area is open range, undeveloped land, and agricultural areas, with only four sensitive noise receptors (all residences) located within 500 feet of the West Segment. There are no sensitive noise receptors within 500 feet of the East Segment from the proposed Red Switchyard to the proposed Blue Substation.

Ambient noise levels typically vary between 40 and 45 dBA, quantified as quiet, with noise levels being slightly increased in the presence of communities and roadways. Based on these existing conditions, an increase in noise levels exceeding 50 dBA would be considered moderate and all noise increases below 50 dBA would be considered low.

Construction activities in all areas without sensitive noise receptors would be temporary and highly localized, and impacts would be short term and low based on the lack of population in the area. For sensitive noise receptors, noise impacts would be experienced when construction is occurring at the localized area. Noise would increase during ROW clearing, erection of transmission structures, stringing of conductors, and the movement of heavy material haul trucks and workers. When combined, the construction of these towers would have low impacts on sensitive noise receptors due to the limited number of sensitive receptors and their general distance from the alignment, with the highest impact potentially coming from helicopter use to assist with tower erection. However, few if any sensitive noise receptors are along the line in areas where helicopter use may be required. All construction impacts would be short term and only occur when construction activities are ongoing.

In addition to construction of the transmission line, increases in noise levels would result from the construction of the proposed Judson, Tande, Red, White, Blue, and Killdeer South 345-kV substations/switchyards. Impacts from construction of these facilities would be similar to those presented for the transmission line, with noise from construction equipment and vehicles and construction labor. Impacts from construction would be limited to the construction period and would be localized to the proposed substation/switchyard areas. While, the construction period of the substations may be longer in the localized area, it would still occur over a relatively short time period with overall impacts from construction being short term and low.

Noise impacts during operation and maintenance of the proposed project are expected to be negligible. Noise attributed to maintenance would occur when and if maintenance needs arise, with field vehicles used to access trouble spots and from the actual maintenance activity. These impacts would be short term and would typically be of low intensity. The operation of the proposed transmission line would result primarily in corona-generated noise, occurring in the atmosphere near the conductor. Changes to local atmospheric pressure may result in a hissing or cracking sound that may be heard directly under the transmission line or within a few feet of the ROW depending on weather, altitude, and system voltage, with the level of corona noise receding with distance. Maximum noise levels associated with corona noise typically do not exceed 50 dBA as heard from the edge of the ROW, during extreme weather events, and noise levels typically do not exceed 25 dBA during fair weather events—less than the ambient sound levels of a library (USEPA, 1974). None of the sensitive noise receptors are close enough to the transmission line to have their noise levels affected; therefore, impacts on noise would be short term and low.

At the site of the proposed substations/switchyards, noise from operations would occur from substation equipment, with substation transformers as the primary source. Sounds commonly associated with a transformer are described as a hum. This hum is created by the expansion and contraction of the core when the transformer is energized and occurs approximately twice per alternating cycle. Noise from substation/switchyard equipment and transmission lines would be the primary source of environmental noise in the area; however, because of the distance to sensitive noise receptors, there would be no adverse increase in noise levels to these areas and increases would be short term and low to all individuals present in these areas.

In addition to noise associated with the operation of the transformers, each transformer would have cooling fans that would create noise while in operation. Noise from these fans would come from either the motor's mechanical noise or through the blades disrupting the air. Of the eight sensitive noise receptors in the area of the transmission line and substations, none are within 500 feet of either of the proposed substations. One residence is located approximately 550 feet from the Judson 345-kV Substation and one residence has the potential to be located within 800 feet of the Tande 345-kV Substation. The Judson 345-kV Substation residence has the potential to recognize increased noise levels; however, it would be expected that all increases to noise levels would be well within an acceptable range and all impacts would similarly be low. Based on the distance to the Tande 345-kV Substation, impacts on the residence are expected to be low.

Alternative D

Impacts from the construction and operation of the proposed transmission line would be the same under Alternative D as those for Alternative C. There are seven sensitive noise areas located within the project area of Alternative D; four of which are located within 500-feet of the proposed transmission line, resulting in low impacts on these areas. Construction and operations impacts associated with the substations for Alternative D are the same as for Alternative C, with overall impacts on noise being low.

Alternative E

Impacts from the construction and operation of the proposed transmission line would be the same under Alternative E as those for Alternative C. There are seven sensitive noise areas located within the project area of Alternative E; five of which are located within 500-feet of the proposed transmission line, resulting in low impacts on these areas. Construction and operations impacts associated with the substations for Alternative E are the same as for Alternative C, with overall impacts on noise being low.

4.0 CUMULATIVE IMPACTS

Cumulative impacts are defined as the "impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Based on the policy guidance and methodology originally developed by CEQ in 1997 and an analysis of current case law, a process based on four primary steps is employed.

- **Step 1—Identify Resources Affected**. In this step, each resource affected by any of the alternatives is identified. These are the same resources described in the affected resources section. If there are no impacts to the resource as a result of the alternatives being considered, then there is no cumulative impact.
- **Step 2—Establish Boundaries.** In identifying past, present, and reasonably foreseeable actions to consider in the cumulative impact analysis, affected resource-specific spatial and temporal boundaries are identified. The spatial boundary is the area where past, present, and reasonably foreseeable future actions have taken place, are taking place, or could take place and result in cumulative impacts to the affected resource when combined with the impacts of the alternatives being considered. This boundary is defined by the affected resource and may be a different size than the proposed project area. For example, impacts to water quality of a stream may include the watershed as the appropriate boundary for the cumulative impact analysis; whereas the analysis boundary for GHG emissions may be global. CEQ guidance suggests that analysis on natural systems should use natural ecological boundaries where practical. In this analysis, the delineated natural ecological boundaries are large; however, most of the Bakken oil and gas activity takes place in the five county-area crossed by the transmission line, and these have been used for the cumulative impacts analysis on terrestrial resources.

  The temporal boundary describes how far into the past and forward into the future actions should be considered in the impact analysis. Appropriate spatial and temporal boundaries may vary for each resource. The temporal boundary is guided by CEQ guidance on considering past action and a rule of reason for identifying future actions.
- **Step 3—Identify Cumulative Action Scenario.** In this step, the past, present, and reasonably foreseeable future actions to be included in the impact analysis for each specific affected resource are identified. These actions fall within the spatial and temporal boundaries established in Step 2. These actions are identified considering guidance from CEQ, such as a document entitled "Guidance on Consideration of Past Actions in Cumulative Effects Analysis" and current case law, such as Ecology Center v. Castaneda, 574 F.3d 652, 667 (9th Cir. 2009), where the court gave deference to CEQ's interpretation of NEPA and stated that, as it relates to past

actions, NEPA requires that an aggregated cumulative effects analysis that includes relevant past projects is sufficient. The agency need not catalog effects that are not truly significant to the area in question.

- **Step 4—Cumulative Impact Analysis.** This final step involves the analysis of the impacts of the actions identified in Step 3 in addition to the impacts of the proposed action and its alternatives. This will result in the total cumulative impact for each resource.

The completion of this process and its corresponding analyses result in a meaningful, defensible, and exhaustive cumulative impact analysis.

4.1 CUMULATIVE EFFECT BOUNDARIES

In identifying past, present, and reasonably foreseeable actions to consider in the cumulative impact analysis, affected resource-specific spatial and temporal boundaries are identified. The spatial boundary is the area where past, present, and reasonably future actions have taken place, are taking place, or could take place and result in cumulative impacts on the affected resource when combined with the impacts of the alternatives being considered. This boundary is defined by the affected resource and may be a different size than the proposed project area. Table 4-1 provides a summary of cumulative impact boundaries by resource area. A detailed assessment of cumulative effect boundaries for each resource considered, including both spatial and temporal boundaries, are described further in the cumulative effects analysis section of this chapter.

Table 4-1: Cumulative Impact Boundaries by Resource Area

Affected Resource	Spatial Boundary	Temporal Boundary
Aesthetic and Visual Resources	The area that is visible from the project. The background is typically defined as 4 miles beyond the horizon line. For the purposes of the project, the spatial boundary will be 10 miles around the proposed route in Williams, McKenzie, Dunn, Mountrail and Mercer counties.	Life of the project; visual impacts will continue unless the transmission line is decommissioned and removed.
Air Quality	The spatial boundary is limited to the airshed in which the proposed action will occur, as project-related impacts could affect air quality within this airshed.	Life of the project (50 years), because some cumulative impacts could be expected to occur throughout this timeframe.
Greenhouse Gases	Given the nature and extent of GHG emissions, the appropriate spatial boundary is global as GHGs have been and are continuing to accumulate in the atmosphere.	Life of the project (50 years).
Geology and Soils	Project ROW	1 to 5 years: short term 5+ years: long term
Surface Water	Upper Missouri River/Lake Sakakawea, Knife River, Little Missouri River, and Little Muddy River sub-basins.	Life of the transmission line (50 years).

Affected Resource	Spatial Boundary	Temporal Boundary
Floodplains	Floodplains located within the project ROW, primarily the Missouri and Little Missouri River floodplains upstream from Lake Sakakawea.	Life of the transmission line (50 years).
Vegetation	5-county area including Dunn, McKenzie, Mercer, Mountrail, and Williams counties	Life of the transmission line (50 years).
Wildlife	5-county area including Dunn, McKenzie, Mercer, Mountrail, and Williams counties	Life of the transmission line (50 years).
Wetlands	5-county area including Dunn, McKenzie, Mercer, Mountrail, and Williams counties	Life of the transmission line (50 years).
Special Status Species	5-county area including Dunn, McKenzie, Mercer, Mountrail, and Williams counties	Life of the transmission line (50 years).
Cultural Resources	APE	Life of the transmission line (50 years).
Land Use	5-county area including Dunn, McKenzie, Mercer, Mountrail, and Williams counties	Life of the transmission line (50 years).
Socioeconomics	5-county area including Dunn, McKenzie, Mercer, Mountrail, and Williams counties	Any cumulative actions that would overlap with the 2-year construction timeline are considered.
Environmental Justice Populations	The census blocks and census tracks within or intersecting the project area.	Any cumulative actions that would overlap with the 2-year construction timeline are considered.
Recreation and Tourism	1 mile of the transmission line; and/or extent of visual, air quality, water quality, traffic, and noise impacts	Life of the transmission line (50 years).
Utility Infrastructure	Project area counties with a focus on those areas within 1 mile of the proposed project.	Impacts would be primarily limited to construction of the proposed project. The analysis will identify known projects that are anticipated to extend 10 to 20 years into the future.
Transportation Infrastructure	Within 6 miles of the proposed project alternatives.	Impacts would be primarily limited to construction of the proposed project. The cumulative impacts analysis will include those projects that are reasonably foreseeable within the next 10 years.
Electric and Magnetic Fields	Within 500 feet of the proposed project.	Life of the transmission line (50 years).
Construction Equipment and Activities	Within 500 feet of the proposed project.	Short-term only. Limited to construction activities.

Affected Resource	Spatial Boundary	Temporal Boundary
Noise	The spatial boundary is contained to all areas within hearing distance of the proposed action	Life of the project (50 years); however, most of the potential cumulative impacts associated with the proposed project are expected to be short-term and limited to the construction phase of the project.

4.2 CUMULATIVE ACTION SCENARIO

Table 4-2 identifies actions that could cumulatively impact specific affected resources within the project area. The table identifies each resource considered and provides an accounting of past, present, and reasonably foreseeable future actions that could contribute to cumulative impacts.

Table 4-2: Activities Related to Cumulative Impacts

Affected Resource	Past Actions	Present Actions	Reasonably Foreseeable Future Actions
Aesthetics and Visual Resources			
Natural features	Clearing of forests and tall grasslands (natural screening) for agricultural and oil and gas activities.	Same as past actions.	Same as present actions.
Built features	Agricultural activities; construction and operation of existing transmission lines and substations; oil and gas activities; commercial and residential development.	Same as past actions.	Same as present actions.
Air Quality and GHG Emissions			
Air quality conditions	Oil and natural gas development, electricity generation, transportation activities, and all agriculture and community development activities.	Same as past actions.	Same as present actions.
Geology and Soils			
Topography	Oil and natural gas activities, transportation activities, and agricultural activities.	Same as past actions.	Same as present actions.
Geology	Oil and natural gas activities.	Same as past actions.	Same as present actions.
Soils	Oil and natural gas activities, transportation activities, water infrastructure activities,	Same as past actions.	Same as present actions.

Affected Resource	Past Actions	Present Actions	Reasonably Foreseeable Future Actions
	agriculture and community development activities.		
Water Resources			
Surface water	Oil and natural gas activities, electric utility activities, transportation activities, water infrastructure activities, agriculture and community development activities.	Same as past actions.	Same as present actions.
Floodplains	Oil and natural gas activities, electric utility activities, transportation activities, water infrastructure activities, agriculture and community development activities.	Same as past actions.	Same as present actions.
Biological Resources			
Vegetation	Clearing of vegetation (including permanent conversion to a non-natural land use) for oil and natural gas activities, mining activities, electric utility activities, transportation activities, water infrastructure activities, agriculture, and community development activities. Introduction of noxious weeds as a result of increased traffic from vehicles/equipment coming from other parts of the country.	Same as past actions.	Same as present actions.
Wildlife	Habitat loss or fragmentation due to oil and natural gas activities, mining activities, electric utility activities, transportation activities, water infrastructure activities, agriculture, and community development activities. Habitat alteration through introduction of noxious weeds as a result of increased traffic from vehicles/equipment	Same as past actions.	Same as present actions.

Affected Resource	Past Actions	Present Actions	Reasonably Foreseeable Future Actions
	coming from other parts of the country. Displacement (temporary and permanent) of species due to increased human activity and increased vehicular related mortality. Increased avian mortality from electrical transmission and distribution structures, oil and gas structures, and uncovered oil pits.		
Wetlands	Draining (dredging) or filling of wetlands due to oil and natural gas activities, mining activities, electric utility activities, transportation activities, water infrastructure activities, agriculture, and community development activities. Introduction of noxious weeds as a result of increased traffic from vehicles/equipment coming from other parts of the country.	Same as past actions.	Same as present actions.
Special status species	Habitat loss or fragmentation due to oil and natural gas activities, mining activities, electric utility activities, transportation activities, water infrastructure activities, agriculture, and community development activities. Habitat alteration through introduction of noxious weeds as a result of increased traffic from vehicles/equipment coming from other parts of the country. Displacement (temporary and permanent) of species due to increased human activity and increased vehicular related mortality. Increased avian mortality from electrical transmission and	Same as past actions.	Same as present actions.

Affected Resource	Past Actions	Present Actions	Reasonably Foreseeable Future Actions
	distribution structures, oil and gas structures, and uncovered oil pits.		
Cultural Resources			
Recorded cultural resources	Oil and natural gas activities, electric utility activities, transportation activities, water infrastructure activities.	Same as past actions.	Same as present actions.
Land Use			
Existing land use	Oil, natural gas development; electric utility activities (construction of power generation and transmission infrastructure); transportation activities (construction of existing roadway, railroad, and airport infrastructure); water infrastructure activities (construction of irrigation and hydropower infrastructure); agriculture and community development activities.	Same as past actions.	Same as present actions.
State and federal properties	Establishment of parks and conservation areas; oil and gas development; federal water development projects; electric utility activities (construction of power generation and transmission infrastructure); transportation activities (construction of existing roadway, railroad, and airport infrastructure); recreational activities.	Same as past actions.	Same as present actions.
Socioeconomics			
Demographic, economic, housing and property values, public services and fiscal conditions	Oil and natural gas activities, electric utility activities, transportation activities, water infrastructure activities, and community development activities.	Same as past actions.	Same as present actions.

Affected Resource	Past Actions	Present Actions	Reasonably Foreseeable Future Actions
Environmental Justice			
Environmental justice populations	Oil and natural gas activities, electric utility activities, transportation activities, water infrastructure activities, agriculture and community development activities.	Same as past actions.	Same as present actions.
Recreation and Tourism			
Dispersed recreational activities	Oil and natural gas activities, electric utility activities, transportation activities, water infrastructure activities, agriculture and community development activities.	Same as past actions.	Same as present actions.
Developed recreational activities	Oil and natural gas activities, electric utility activities, transportation activities, water infrastructure activities, agriculture and community development activities. Establishment of developed recreational facilities.	Same as past actions.	Same as present actions.
Infrastructure and Transportation			
Utility infrastructure	Oil and natural gas activities, electric utility activities, and water infrastructure activities.	Same as past actions.	Same as present actions.
Transportation infrastructure	Oil and natural gas activities, transportation activities.	Same as past actions.	Same as present actions.
Public Health and Safety			
Electric and magnetic fields	Oil and natural gas activities, electric utility activities.	Same as past actions.	Same as present actions.
Noise			
Ambient noise levels	Oil and natural gas activities, electricity generation activities, transportation activities and agriculture and community development activities.	Same as past actions.	Same as present actions.

4.3 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

The following section provides an overview of past, present, and reasonably foreseeable future actions that have affected, are affecting, or have the potential to affect, the resources analyzed in the cumulative effects analysis.

Oil and Natural Gas Activities

Oil and gas development and production has been and will continue to be a major activity in western North Dakota over the next several years. The focus of much of the recent development has been on the Bakken-Three Forks Formation. The number of new wells drilled and completed has continued to increase over the last several years. Table 4-3 shows the number of wells completed for each county within the project area between 2008 and 2011. In addition, more than 1,000 wells have been permitted for drilling during the first 6 months of 2012 (North Dakota Industrial Commission, 2013).

Table 4-3: Total Wells Completed in Select Counties in North Dakota

	2008	2009	2010	2011	2012
Dunn	119	105	132	202	292
McKenzie	73	72	145	275	507
Mercer	0	1	0	0	1
Mountrail	193	236	293	316	384
Williams	34	32	116	256	431
Total	419	446	686	1,049	1,615

Source: North Dakota Industrial Commission, 2013

The intensive oil development can lead to other impacts on land, air and water resources. For instance, an estimate of the land area needed to support the oil development was made by applying an average acreage needed to drill and operate each well by the number of wells completed each year. Assuming approximately 5 to 7 acres are needed per well drilled, the average land area utilized in the development ranged from 2,500 acres in 2008 to 6,300 acres in 2011 for counties within the project area shown in Table 4-4.

The North Dakota Department of Mineral Resources has estimated the future development potential for the Bakken Formation in western North Dakota. Table 4-4 summarizes the estimated number of wells for select areas in or near the project area. This includes the number of wells to be drilled per year and the number of years the development will take to complete. Using an assumption that each well will require 5 to 7 acres for development, the total land area needed to support the future activity is estimated to range from 7,700 to 9,700 acres per year.

Table 4-4: Estimated Future Oil Development in Select Areas in Western North Dakota

	Number of Wells Predicted	Development Years
Ray-Tioga	430 - 540	11 to 14
Watford City - Keene	250 -310	5 to 7
Killdeer	235 - 290	6 to 8
Parshall	375 - 470	7 to 8

Source: NDDMR, 2011

Specific projects associated with oil development and other projects considered in the cumulative impact analysis are summarized in Table 4-5. In accordance with CEQ guidance, this list primarily includes present and reasonably foreseeable future actions in the five-county cumulative impact assessment area.

Table 4-5: Past, Present and Reasonably Foreseeable Future Activity

Activity	Type of Activity	Description	Locations within the Project Area
Oil and Natural Gas Activities			
BakkenLink Pipeline LLC	Oil pipeline	Present activity (in-service date of June 2013)—Line would transport crude oil 132 miles to a rail-loading point in Fryburg, about 30 miles west of Dickinson. Receipt points would be Trenton, Ray, and Beaver Lodge in Williams County; Stanley and New Town in Mountrail County; Alexander, Keene, and Watford City in McKenzie County; and Dunn Center in Dunn County.	Williams, Mountrail, McKenzie, and Dunn counties
Bear Den Project of CenterPoint Energy Bakken Crude Services LLC	Gathering lines	Future activity—A system of gathering lines would be constructed in northwestern Dunn and southeastern McKenzie Counties to collect oil from the Little Missouri River area and transport it to a collection point on U.S. Route 85 south of Watford City	Dunn, McKenzie counties
Bear Paw Energy LLC	Proposed gas plant and pipeline for natural gas, gasoline, and other natural gas liquids	Future activity—The Garden Creek Gas Plant is proposed to be located near Watford City and would operate on 80 acres, producing natural gas and gasoline with other natural gas liquids. A proposed pipeline would transport the product 54 miles west to Sidney. Two additional facilities designated Stateline I and Stateline II, are proposed near Williston. A pipeline would also be constructed from these facilities to Sidney, but the route has not been proposed at this time.	McKenzie County
Belle Fourche Pipeline	Oil pipeline	Future activity—The pipeline would transport crude oil from Alexander southward to a receipt point in Baker, Montana.	McKenzie County

Activity	Type of Activity	Description	Locations within the Project Area
Bridger Pipeline LLC	Oil pipeline	Present activity—The Four Bears Pipeline delivers oil from McKenzie and Dunn counties, beginning at ND State Highway 23 near Hawkeye and extending south through Dunn County to Fryburg in Billings County, a distance of 77 miles.	McKenzie and Dunn counties
Enbridge Pipelines LLC, Sanish Pipeline	Oil pipeline	Future activity—A 42-mile crude oil pipeline would be constructed from Johnsons Corner in eastern McKenzie County north to Beaver Lodge near Tioga in Williams County.	McKenzie, Williams counties
EOG Resources	Crude oil-to-railroad loading facility	Present activity—A crude oil-to-railroad loading facility operates in Stanley, North Dakota, transporting oil by rail to Stroud, Oklahoma. Up to one unit train per day with a maximum capacity of 60,000 gross barrels of oil per train is shipped.	Mountrail County
Hess Corporation	Natural gas plant and rail loading facility	Present activity—Expansion of existing Tioga natural gas plant from 100 to 250 million cubic feet of natural gas per day. Operation of a rail loading facility	Williams County
Hess Hawkeye Pipeline System	Natural gas liquids, gas, and oil pipelines	Future activity—The proposed pipelines would transport oil, natural gas, and natural gas liquids from the existing Hawkeye Central Station through a transfer point at the existing North Charlson Compressor Station located south of Lake Sakakawea. The system would use existing pipelines to transport product beneath Lake Sakakawea to the North River Crossing Compressor Station located on the north side of Lake Sakakawea. The pipeline would continue north to either the existing Hess Ramberg truck facility or the Silurian Compressor Station located approximately eight and seven miles respectively south of Tioga North Dakota.	McKenzie, Williams counties
Hiland Partners	Gas processing plant and gathering system	Present and future activity—Expansion of a gas processing plant at Cartwright on the Yellowstone River to process 85 million cubic feet per day. The company also operates the Norse Gathering System in northern Williams and also in Divide and Burke counties.	McKenzie and Williams counties
Inergy Midstream LP	Crude oil loading terminal and pipeline	Future activity—Proposed development of a crude oil loading terminal in Epping, North Dakota to serve as a marketing hub and a proposed connector pipeline to the Tioga area; a 20-mile pipeline would connect Tioga to Epping.	Williams County

Activity	Type of Activity	Description	Locations within the Project Area
ONEOK	Pipeline	Future activity—Proposed Bakken Pipeline would transport natural gas liquids from natural gas processing plants in the Bakken shale to the Overland Pass Pipeline and would extend from Sidney, Montana, southward to Weld County, Colorado.	McKenzie and Williams counties
Rangeland Energy	Crude oil loading terminal	Future activity—Proposed development of a crude oil loading terminal in Epping, North Dakota to serve as a marketing hub and a proposed connector pipeline to the Tioga area.	Williams County
Plains Pipeline LP	Crude oil pipelines	Future activity—Construction of 17 miles of pipeline from east of Stanley to Ross; construction of 103-mile pipeline from Trenton northwest to Raymond, Montana and on to Regina, Saskatchewan.	Mountrail, Williams counties
Saddle Butte Pipeline, LLC	Pipeline	Future activity—The proposed High Prairie Pipeline would extend 450 miles from Alexander, North Dakota to Clearbrook Minnesota, including across northern McKenzie and southern Mountrail counties. A 17-mile lateral would extend from Charlson south to Johnsons Corner in McKenzie County.	McKenzie and Mountrail counties
Saddle Butte Pipeline, LLC	Oil and gas pipelines and natural gas processing facility Gathering system with lateral pipelines and trunklines	Present and future activity—Oil and gas gathering pipelines are located south of Watford City, with terminals or receipt points in Alexander, Midway, Johnsons Corner, Charlson, and Antelope. A natural gas processing facility is 7 miles south of Watford City, processing 25 million cubic feet per day. The proposed Grasslands Gathering System would involve 80 miles of lateral pipelines and 100 miles of trunklines. The Saddle Butte Pipeline extends into Dunn County.	McKenzie and Dunn counties
Savage Services	Rail terminal	Future activity—Planned multi-user rail terminal in Trenton, North Dakota to load and ship unit trains of crude oil and other oil-field related materials.	Williams County
TransCanada	Natural gas facility and receipt facilities	Past and present activity—The Northern Border Pipeline is a natural gas facility that extends northwest to southeast across the region of influence. It receives gas from Williston processing plants and synthetic gas from the Dakota Gasification Plant. There are receipt facilities at Buford, Charbonneau, and Watford City.	Williams, McKenzie, Dunn, and Mercer counties
Vantage Pipeline US LP	Ethane pipeline	Future activity—Construction of a pipeline from Tioga north to Empress, Alberta.	Williams County

Activity	Type of Activity	Description	Locations within the Project Area
Williston Basin Interstate Pipeline	Natural gas facility and pipelines Natural gas pipelines	Past and present activity—This natural gas facility has lines from Watford City to Williston and Williston to Tioga, then north to Canada and east to Minot. Other natural gas lines connect natural gas plants in Billings County with the Northern Border Pipeline in Dunn County.	McKenzie, Williams, and Dunn counties
Continental Resources	Oil and gas development	Future activity—Development of a mega-pad near Williston to support horizontally drilled wells.	Williams County
Electrical Utility Activities			
Charlie Creek to Antelope Valley 345-kV	Electric transmission line	Existing transmission lines.	Mercer, Dunn, and McKenzie counties
Charlie Creek-Squaw Gap 115-kV	Electric transmission line	Existing transmission lines.	McKenzie County
Williston to Tioga 230-kV	Electric transmission line	Existing transmission lines.	Williams and Mountrail counties
Logan to Tioga 230-kV	Electric transmission line	Existing transmission lines.	Ward and Mountrail counties
Tioga to Canada 230-kV	Electric transmission line	Existing transmission lines.	Mountrail and Burke counties
Culbertson to Williston 115-kV	Electric transmission line	Existing transmission lines.	Williams County, North Dakota and Roosevelt County, Montana
Williston to Genora 115-kV	Electric transmission line	Existing transmission lines.	Williams County
Williston to Tioga 115-kV	Electric transmission line	Existing transmission lines.	Williams and Mountrail counties
AVS, Beulah	Lignite-fired units	Past, present, and future activity—Two 450-MW lignite-fired units.	Mercer County
Central Power Electric Cooperative	Electrical grid expansion	Future activity—Major expansions to electrical grid to provide electricity to oil and gas industry related infrastructure and to private, and commercial and industrial businesses in their service territory. New Minot Southwest Substation. Expansion of the Berthold Tap. New Kenaston Tap. All located to the east of the cumulative effects analysis area in Minot, North Dakota.	Ward, and McLean counties

Activity	Type of Activity	Description	Locations within the Project Area
Charlie Creek to Williston (Western)	Transmission line upgrade	Present activity—Upgrade from 115-kV to 230-kV completed and currently in service.	McKenzie and Williams counties
Coteau Properties Company, Freedom Mine	Lignite coal mining	Past, present, and future activity—700 to 1,000 acres per year mined for lignite coal in Beulah, North Dakota.	Mercer County
Dakota Gasification Company	Natural gas production plant	Past, present, and future activity—Production of natural gas for Northern Border Pipeline.	Mercer County
Lonesome Creek Station	Natural gas peaking facility	Present and future activity—Natural gas peaking facility between Alexander and Watford City, North Dakota. Connected by a 115-kV transmission line to McKenzie Electric Power Cooperative's existing Hay Butte Substation.	McKenzie County
McKenzie Electric Power Cooperative	Electrical grid expansion	Present and future activity—Major expansions to electrical grid in Watford City, North Dakota.	McKenzie County
Mountrail-Williams Electric Cooperative	Electrical grid expansion Substations	Present and future activity—Major expansions to electrical grid in Williston, North Dakota. The Wheelock Substation is in Williams County and a new Blaisdell Substation is in Mountrail County. Proposed 45-MW natural gas peaking facility connected by a 115-kV transmission line to the MWEC existing Stateline Substation (2012).	Williams and Mountrail counties
Pioneer Generation Station	Natural gas peaking facility	Present and future activity—Natural gas peaking facility in Williston, North Dakota. Connected by a 115-kV transmission line to the MWEC existing Stateline Substation.	Williams County
Transportation Activities			
Williston Roadway Improvements	Road	Future activities—East Williston Truck Route. Will reduce traffic on East Dakota Parkway. Northwest Bypass. Will bypass the city of Williston allowing traffic to flow without interference from local traffic and reducing congestion within the city. 32nd Avenue West. Will provide north/south connection between Highway 2/85 and 53rd Street NW. Williston Truck Reliever Route. Temporary route involving upgrades to Williams County Route 1 (145th Avenue NW) and CR 6 (57th Street NW).	Williams County
New Town Truck Reliever Route	Road	Future activities—New Town Truck Reliever Route. A temporary route around the north side of New Town, from 1.5 miles east of New Town to 1 mile west of New Town.	Mountrail County

Activity	Type of Activity	Description	Locations within the Project Area
Watford City Truck Reliever Route	Road	Future activity—Watford City Truck Reliever Route. Location unknown but it is expected to provide a southwest bypass.	McKenzie County
Killdeer Truck Reliever Route	Road	Future activity—Killdeer Truck Reliever Route. Location unknown.	Dunn County
U.S. Highway 85 Reconstruction	Road	Future activity—U.S. Highway 85 reconstruction from Arnegard to Williston. Priority is on rebuilding U.S. Highway 85 bypassing Alexander.	McKenzie and Williams counties
ND State Highway 200 Reconstruction	Road	Future activity—ND State Highway 200 reconstruction from U.S. Highway 85 to Beulah.	Dunn and McKenzie counties
Expansion of Williston Airport	Airport	Future activity—Expansion of Williston Airport to accommodate the increase in passenger traffic due to North Dakota's oil development.	Williams County
Water Infrastructure Activities			
Lake Sakakawea	General development	Past activity—Change in environment from a large new flatwater lake. Recreation facilities and some rural residential development.	Dunn, McKenzie, Mercer, Mountrail, and Williams counties
Southwest Pipeline Project	Water pipeline and supporting infrastructure	Future activity—Withdrawal of water from Lake Sakakawea to support regional water supply. Includes water treatment, main water transmission, and rural distribution.	Dunn and Mercer counties
Western Area Water Supply Project	Water supply infrastructure	Present activity—Delivery of water from Williston treatment plant to surrounding areas.	McKenzie, Mountrail, and Williams counties
Agriculture and Community Development Activities			
Extraterritorial Area Expansion	Expansion of extraterritorial area	Present activity—Expansion of Williston, North Dakota's extraterritorial area from 1 to 2 miles to allow additional zoning control of development.	Williams County
Housing Clusters	Housing development	Present activity—New temporary and permanent housing clusters on the outskirts of existing communities, increasing the suburban character of some of the area.	
North Dakota Department of Trust Lands Energy Impact Office	Infrastructure expansion	Future activity—The North Dakota Department of Trust Lands Energy Impact Office provides grants to extend city streets, expand sewer systems, expand landfills, and provide other public infrastructure upgrades.	

Activity	Type of Activity	Description	Locations within the Project Area
Flex PACE Affordable Housing Program	Housing development	Future activity—The Bank of North Dakota, under its Flex PACE Affordable Housing Program, provides low-interest loans for the construction of multi-family housing projects in oil producing counties. This is a new program announced in 2012 and it is projected that a minimum of ten affordable housing projects will be financed by the $3 million available for interest rate buy downs.	
North Dakota Housing Finance Agency Tax Credits	Housing development	Present and future activity—The North Dakota Housing Finance Agency provides tax credits for developers of low- and moderate-income housing. Currently 286 affordable housing units are under construction and $42 million in residential housing projects are under construction.	
Grazing	Livestock grazing	Past and present activity—Livestock grazing has caused stream impairment in Knife, Little Missouri, and Little Muddy rivers.	
Treatment of Noxious Weeds	Land disturbance	Past, present, and future activity—Land disturbance due to expansion of noxious weed-infested areas. LMNG has an active program to treat noxious weed areas.	

4.4 CUMULATIVE EFFECTS ANALYSIS

This section analyzes the impacts of the actions identified above in addition to the impacts of the proposed action and its alternatives. This will result in the total cumulative impact for each resource.

4.4.1 Aesthetics and Visual Resources

Past actions that have affected visual resources in the project area include several oil and natural gas development and production projects, electrical utility construction, transportation improvements, and agricultural development. Present and ongoing activities that alter the landscape include agricultural activities (mainly crop production and livestock grazing), oil and mining operations, and operation of existing power lines.

Landscapes within the project area vary based on the location. The southern portion of the project area is a mosaic of agricultural fields and rolling prairie, with areas of grazing along steeper slopes. Rural homesteads and cleared well sites are the most common interruption to the landscape. The central portion of the project area consists of deep, highly eroded canyons and badlands with heavily wooded draws, as well as portions of national grasslands and a national park. The landscape is largely natural, with few human influences along ridges and cleared well sites and agricultural areas dominating the valleys. The northern portion of the project area is predominately agricultural, with large oil and gas operations dominating the built environment.

Past and present actions have resulted in changes to the natural landscape and visual resources particularly in the northern portion of the project area. Agricultural conversion, oil and gas extraction, and pipelines and transmission line construction have all altered the landscapes.

Past actions constructed linear features (transmission line, pipelines, roads, and railroads) across some visually sensitive areas. For this project, alternatives were sited to follow existing linear infrastructure to mitigate visual impacts in sensitive areas. All alternatives cross the Missouri River, the Little Missouri River (different locations), and the Lewis and Clark National Historic Trail in the vicinity of U.S. Highway 85 and/or adjacent to existing linear features. Alternative C crosses a portion of the LMNG, following U.S. Highway 85 and an existing transmission line corridor. This alternative would create a new crossing of the scenic byway, in between three other existing transmission line crossings within a 20-mile stretch of road. Alternatives D and E would not cross the national grasslands or national park lands, but would cross the scenic byway along an existing transmission line and gas pipeline. Placing the potential transmission line adjacent to an existing transmission line would help to mitigate cumulative visual impacts, by reducing the number of times a motorist or visitor would pass under a transmission line. Alternative E would involve the additional construction of a second 345-kV line north of Killdeer for 61 miles and the addition of the Red Switchyard and White and Blue substations as noted in Alternative C. The placement of two lines would result in a higher degree of visual contrast on the landscape compared to that of a single line.

Given ongoing industrial and energy development in the area, it is likely that additional electrical infrastructure (transmission and distribution lines and substation expansions) will be built in the future. Standard transmission siting practices state that when siting a new transmission line, efforts should be made to parallel existing linear features. If, at some time in the future, an additional transmission line is proposed within the project area, it is likely that the current project would be seen as an opportunity site for the construction of additional transmission line features, which could be built parallel to the line. Paralleling is seen as an opportunity to mitigate visual impacts on landscape, since similar visual impacts have previously occurred. Since characteristics of the landscape have previously changed and will continue to change over time, Alternatives C and E would contribute to long-term, low to moderate intensity cumulative impacts, and Alternative D would contribute to long-term, low intensity cumulative impacts.

4.4.2 Air Quality

The proposed project would construct and operate a transmission line, substations, and potentially a switchyard. The construction of these components would emit regulated amounts of criteria pollutants; however, this project, which would only create temporary particulate emissions, would not add to those NO_x and other pollutant levels. Construction of the components would add temporary fugitive dust and exhaust emissions to the airshed in the area and would add to GHG emissions. This would occur primarily during construction and during maintenance activities, once the project is in operation. The proposed project, when added to other past, present, and proposed projects, would not contribute to a violation of air quality standards and would not significantly contribute to adverse cumulative effects on air quality or GHG emissions.

The northwest region of North Dakota is experiencing rapid development because of recent gas and oil activities. As a result of these activities, there is a dynamic, continuing, and growing need for more power to be delivered to the area. A study conducted by the IS evaluated the power supply and power delivery in the region to determine the adequacy of the existing transmission system from both a system delivery and reliability perspective (IS, 2011). The AVS to Neset Transmission Project is one of the projects identified in the study to deliver additional power to this region. But the power delivered by the AVS to Neset Transmission Project would come from a variety of generation resources on the IS, of which AVS is only one. In fact, AVS Units 1 and 2, both which commenced commercial operation in the mid-1980s, have operated at near-capacity for a couple decades, and do not have additional power to supply.

New generation built to serve the growing load on the IS since 2000 has been almost exclusively wind and natural gas, including 1) more than 700 MW of new wind generation capacity owned or purchased through power-purchase contracts by Basin Electric, 2) approximately 300 MW of natural-gas-combined-cycle generation owned and operated by Basin Electric that began commercial operation in August 2012 near White, South Dakota, and 3) approximately 380 MW of natural-gas-combustion-turbine generation owned and operated by Basin Electric near Groton, South Dakota, and Culbertson, Montana. As described below, an additional 270 MW of natural-gas-combustion-turbine generation is being permitted and constructed for voltage support and power in the Bakken region at two locations near Williston and Watford City, North Dakota, prior to completion of the AVS to Neset Transmission Project. Once the AVS to Neset Transmission Project is completed, new additional natural-gas-peaking power would become more readily available to all IS customers, not just the customers in the Bakken region of northwest North Dakota.

Finally, much of the new additional load that the AVS to Neset Transmission Project would serve is related to new natural gas processing facilities processing and compressing gas from the new production wells in the Bakken Formation. This domestically-produced natural gas will supply a clean, lower-carbon-intensive fossil fuel that will displace higher-carbon-intensive coal and oil. The high-grade oil produced from the Bakken Formation is also displacing imports of foreign oil, and is low in sulfur and easily distillable—factors that make it less carbon-intensive than foreign oil, with less of an environmental impact from transportation to the refinery and from processing at the refinery.

Air Emissions from Electricity Generation

As noted above, AVS has been operating at capacity or near-capacity for several decades. Consequently, there will not be any additional air emissions from AVS as a result of producing additional electricity for the new proposed AVS to Neset Transmission Project. AVS injects its power into the IS, and the power to serve the additional load in northwest North Dakota is drawn from the entire IS, not just AVS. The new generation resources Basin Electric has added to serve the IS and other east-side-grid customers since 2000 have been almost exclusively wind and natural gas, and the approximately 270 MW of new natural-gas-combustion-turbine resources currently being permitted and added in northwest North Dakota will have new-source-performance-standard and best-available-control-technology level review and controls for all regulated pollutants, including GHGs.

The results of the study (IS, 2011) indicate that between 2012 and 2016 several local distribution transmission line projects will be required to correct deficiencies at specific locations. In addition, the study notes that voltage support will be required at strategic locations to prevent any interruptions of service on the existing transmission lines that result from the increased thermal loading because of voltage or current flow fluctuations on the lines due to the increasing electrical demand. In response to those studies, Basin Electric is developing the Pioneer Generation Station, near Williston and the Lonesome Creek Station, near Alexander to provide the necessary voltage support during periods of peak demand in the region.

Phase I of both projects will include a 45-MW simple cycle combustion turbine. Both Phase I projects will be in-service by mid-2013. Pioneer Generating Station Phase II and Lonesome Creek Station Phase II projects consist of placing two additional 45-MW simple cycle combustion turbines at each location. The two Phase II projects are scheduled to be completed in 2014 and 2015. These projects, consisting of approximately 270 MW of capacity, are needed to protect the reliability of power delivery and load-serving capacity of the region independent in utility and timeline of the proposed AVS to Neset Transmission Project. Further, since they are intermediate and peaking resources that can chase load, they are ideal for addressing the immediate power needs in this area, but will provide reliable peaking power for the whole IS once the AVS to Neset Transmission Project is completed, and will be an ideal complementary form of generation to any additional wind resource added to the IS in the future. Since most of the new load in the Bakken Formation is of a 24-hour-a-day, 7-days-a-week, 365-days-a-year variety, wind is not an available option to supply this new load. But once natural-gas-combustion-turbine generation is available, wind becomes an option as a complementary generation resource as baseload generation needs increase. The addition of these resources will avoid and mitigate additional impacts from generation to serve load in the Bakken Formation.

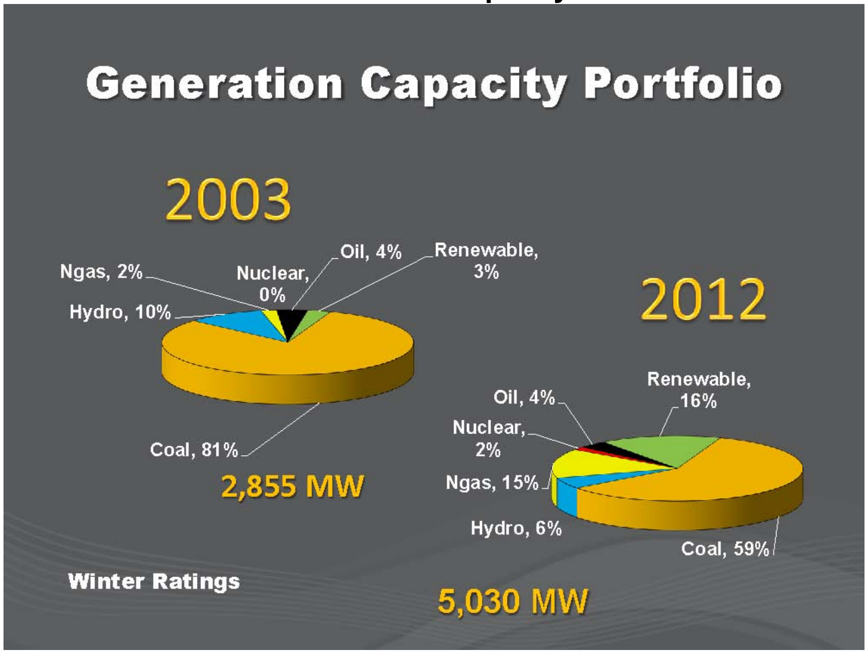
Further, this new generation will avoid and displace portable generation and combustion-engine-driven oil and gas extraction engines at the wells. It will also hasten the capture of more of the natural gas at the well-heads, and avoid both the flaring and release of natural gas during the oil extraction process.

The purpose of the AVS to Neset Transmission Project is to increase high voltage transmission line system reliability and the transmission load-serving capacity in the region. The project would allow electricity that is currently being produced by Basin Electric and the other generation facilities interconnected to the IS to be effectively delivered to northwest North Dakota.

The AVS 345-kV Substation, located at the AVS generation facility, near Beulah, North Dakota has developed over the years as a hub for the flow of electricity into the northwest North Dakota region. The AVS 345-kV Substation is electrically interconnected with multiple generation resources that are owned by the various owners of generation resources within the IS system. These multiple generation sources of electrical power include natural gas, coal- and oil-fired generation, hydroelectric facilities, and renewable generation sources such as wind and waste heat recovery. These regional power generation resources will be managed by the IS in such a way to provide reliable power from the IS transmission system to the proposed new AVS to Neset Transmission Project.

In sum, the AVS to Neset Transmission Project's interconnection to the AVS 345-kV Substation would not increase additional air emissions from the AVS generation facility because the AVS generation facility operates near full capacity and does not have operating reserves to generate more power from either a capacity or availability perspective. Historically, the two units at the AVS generation facility typically operate at their full available output, in full compliance with their air permit. Further, there could be a minor increase in air emissions from the existing power generation facilities operated by Basin Electric, of which AVS is a part, or from the other generation facilities interconnected with the IS transmission system that currently support the existing loads and to serve the projected load growth in Basin Electric's service territory. As noted in Figure 4-1, between 2003 and 2012, as demand for power continued to increase in Basin Electric's service area, Basin Electric modified its mix of power generation production to include a higher percentage of generation from renewables (primarily wind), nuclear, and natural gas, as opposed to coal, to reduce GHG emission sources.

Figure 4-1: Basin Electric Generation Capacity Sources 2003 vs 2012



Source: Basin Electric, 2012a

Air Emissions from Bakken Oil and Gas Development

As noted above, the northwest region of North Dakota has seen rapid oil and gas growth in recent years and as such emissions of criteria pollutants and GHGs are occurring from oil and gas development, especially where there is methane flaring. Primary emissions associated with this oil and gas development come from the operation of drilling rigs and vehicle emissions leading to the increase in the discharge of CO_2, NO_2, and particulates. To control emissions associated with this development and to curb potential impacts associated with the construction and operation of drilling rigs and vehicle transit, the North Dakota State Department of Health and Consolidated Laboratories adopted rules specific to the oil and gas production industry as detailed in “Control of Emissions from Oil and Gas Production Facilities”, Chapter 33-15-20, of the North Dakota Air Pollution Control Rules (Story, undated). In addition to rules and regulations put in place to minimize impacts, air quality in the region is generally considered good and there are no nearby non-attainment areas in the vicinity of the oil and gas development. Therefore while oil and gas development in northwest North Dakota has led to an increase in the release of criteria pollutants, it currently has not led to a violation of National Ambient Air Quality Standards or other applicable air quality standards. While overall combined construction activities of the proposed project and further construction and operational activities associated with oil and gas production would increase the level of exhaust emissions, fugitive dust, and other construction-related emissions above the current levels, it is not anticipated that the construction and operation of the proposed project would appreciably affect the area’s overall air quality and would be a minor contributor when compared to the emissions associated with oil and gas production. Therefore, the proposed project would not cause adverse cumulative effects to air quality nor would it have a noticeable impact on global GHG emissions.

4.4.3 Geology and Soils

The spatial boundary for cumulative impacts on geology and soils includes the area within the proposed 150-foot utility line ROW and additional areas of land disturbance associated with the substations. The temporal boundary for cumulative impacts on geology and soils is 50 years, taking into account the anticipated continued development of the Bakken field.

The various pipeline and transmission line projects would result in temporary disturbances to soils with intensities in excess of disturbances associated with normal agricultural activities. Following the construction period, soils within the majority of the ROW would still be available for the same agricultural or grazing uses that occurred prior to construction. Permanent conversion would occur in the area of substations, natural gas processing plants, transmission towers, and road projects. The proposed project would contribute to a minor amount of soil disturbance in the ROW and would cause permanent conversion at the locations of transmission towers. However, the amount of permanent soil disturbance for construction of the transmission line is estimated to be minimal. Permanent disturbances would be as follows: 1.4 acres for Alternative C, 1.3 acres for Alternative D, and 1.6 acres for Alternative E. For the substations, the amount of permanent soil disturbance is estimated to be 73 acres under Alternative C and 85 acres under Alternatives D or E. Taken within the cumulative context of impacts on geology and soils occurring within the entire ROW, these amounts would not cause adverse cumulative effects on soils or prime farmland in the region.

4.4.4 Water Resources

Groundwater

Cumulative impact boundaries are not applicable to groundwater resources for the following reasons.

The numerous drilling activities occurring in and around the project area, in addition to the associated development activities, are affecting groundwater supply and quality. As long as the Bakken field continues to develop, these impacts will occur regardless of whether the transmission line is built. Since the construction of the project does not have any direct impacts on groundwater resources, it also does not contribute to direct cumulative impacts on groundwater resources.

Cumulative impacts on groundwater quality from spills are expected to be negligible due to the comprehensive and immediate clean-up requirements for industry. However, since the project would facilitate further development activities within the Bakken field, indirect cumulative impacts on groundwater supply and quality may exist but the project's contribution to these impacts is expected to be minimal.

Surface Water

The spatial boundary for cumulative impacts on surface water resources includes surface waters in the Upper Missouri River/Lake Sakakawea, Knife River, Little Missouri River, and Little Muddy River sub-basins. The temporal boundary for cumulative impacts on is 50 years taking into account the anticipated continued development of the Bakken field.

Pipeline and associated facility construction projects and private agricultural activities in the project area have contributed to negative impacts on surface water resources. These impacts have occurred primarily through erosion and sedimentation related to crop cultivation and road construction, runoff from agricultural areas, and wastewater pollution. Construction of the transmission line would use onsite erosion and sedimentation controls to prevent any direct cumulative effects on surface water quality.

Existing commercial and industrial development projects have affected the surface water supply primarily through drinking water and sewage water treatment, but also through the use of surface water in industrial activities. As long as the Bakken field continues to develop, these impacts will occur regardless of whether or not the proposed project is built. The transmission line alone would not create new demands for water, and therefore would not contribute to direct cumulative impacts on surface water supply.

Because the project would facilitate further development activities within the Bakken field, indirect cumulative impacts on surface water supply and quality may exist but the project's contribution to these impacts is expected to be minimal.

Floodplains

The spatial boundary for the cumulative impacts on surface water resources includes all floodplains within the project area. The temporal boundary for cumulative impacts on surface water resources is 50 years, taking into account the anticipated continued development of the Bakken field.

Construction activities in floodplains within the project area occur primarily as linear facilities (pipelines, transmission lines, and roads). As long as the Bakken field continues to develop, impacts resulting from these activities will occur regardless of whether the proposed project is built. The transmission line construction would span floodplains where possible, which would not facilitate floodplain development. Therefore, direct cumulative effects would be minimal.

Since the project would facilitate further development activities within the Bakken field, indirect cumulative impacts on floodplains may exist but the project's contribution to these impacts is expected to be minimal.

4.4.5 Biological Resources

Vegetation

While most natural vegetation has been converted to agricultural lands, extensive areas of the study area, including the Missouri Plateau, Little Missouri Badlands, and River Breaks ecological subregions retain their native vegetation. Most of the Glaciated Dark Brown Prairie, Missouri Coteau Slope, and Northern Missouri Coteau Slope have been converted to agriculture. Non-agricultural related vegetation disturbance in the study area is due mainly to oil and gas development activities, and the associated residential/community development; transportation; and utility development activities. Development and production of oil, particularly from the Bakken and Three Forks formations, has rapidly elevated North Dakota to one of the nation's leaders in oil production. Recent and planned projects in the region are discussed in Section 4.4.

Most of these development activities permanently convert vegetated acreage to non-vegetated residential or industrial land uses. Transmission lines and pipelines are the exceptions; they retain vegetative cover or revegetate after disturbance. However, to maintain and ensure the safety and reliability of these structures, forested areas or areas of dense shrubby vegetation are cleared and converted to grasslands. Increased traffic in the study area has also increased the number of noxious weeds found and their coverage. Increases in oil and gas development activities and the associated residential/community development, transportation, and power development activities are expected to occur in the study area for the foreseeable future.

The proposed project would result in short-term impacts on vegetation that is temporarily disturbed during the construction phase, including construction access trails. Long-term impacts on vegetation would be limited to the permanent conversion of vegetated lands to utility land uses (transmission structures, substations, and switchyards), conversion of forested or wooded vegetated cover to herbaceous cover, and disturbance related to maintenance activities (mowing, herbicide application, tree trimming, and danger tree removal).

Alternative C is expected to result in temporary disturbance of up to approximately 4,957 acres of vegetation during construction, permanent conversion of up to approximately 183 acres of forested vegetation to herbaceous vegetation, and permanent conversion of up to approximately 75 acres of vegetated land to transmission structure sites, substation sites, and a switchyard. Alternative D is expected to result in temporary disturbance of up to approximately 4,459 acres of vegetation during construction, permanent conversion of up to approximately 120 acres of forested vegetation to herbaceous vegetation, and permanent conversion of up to approximately 86 acres of vegetated land to transmission structure sites, substation sites, and a switchyard.

Alternative E is expected to result in temporary disturbance of up to approximately 5,597 acres of vegetation during construction, permanent conversion of up to approximately 189 acres of forested vegetation to herbaceous vegetation, and permanent conversion of up to approximately 88 acres of vegetated land to transmission structure sites, substation sites, and a switchyard.

Given that the majority of the impacts on vegetation from the proposed project are short term, the contribution to direct cumulative effects on vegetation is minimal given the magnitude of permanent land conversion associated with oil and gas, residential, community, and transportation development activities. Construction BMPs would be implemented to avoid the spread of noxious weeds in the ROW; therefore, the project is not expected to have a direct cumulative effect on the spread of noxious weeds. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on vegetation are likely to occur; however, the project's contribution to these impacts is expected to be minimal.

Wetlands

About half of the 5 million acres of wetlands originally present in North Dakota have been lost. Most of these wetlands were in the prairie pothole area. In the study area, prairie potholes are not common but are most likely to occur in the Northwestern Glaciated Plains (Northern Missouri Coteau and Glaciated Dark Brown Prairie ecoregions). Most historic wetland loss in this region was due to draining and conversion for crop production. Current and future wetland loss in the study area is primarily associated with oil and gas, residential, community, and transportation development. However, the high cost of permitting and mitigating impacts on wetlands and other waterbodies under the CWA often provides an incentive to avoid or minimize impacts on these areas. The CWA permitting process considers the effect of cumulative impacts and, in most cases, requires mitigation for impacts on wetlands or other waterbodies.

Under Alternatives C, D, and E there is an anticipated impact to an estimated 0.02-acre of forested wetland, which would result in conversion from a forested wetland to an herbaceous wetland. It is not known how many, if any, low-water crossings or culverts would be needed for each alternative. However, culverts and water crossings would only be installed for construction and would be removed when construction is completed. No permanent fill of wetlands is anticipated as part of construction for the project. Wetland and stream crossings would only be allowed during dry periods or at designated crossing locations. The impacts on wetlands and other waterbodies would not be known for certain until a jurisdictional wetland delineation identifies wetlands and other waterbodies regulated under CWA and there is a final design for the transmission line. However, the proposed project would avoid wetlands impacts when possible and minimize impacts when they are unavoidable. Wetland impacts associated with the project would be minimal, if they occur at all, and would not measurably add to the cumulative effects on wetlands. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on wetlands are likely to occur; however, the project's contribution to these impacts is expected to be minimal.

Wildlife

The less common wildlife species in this area, including elk, bighorn sheep, and mountain lion are associated with the Little Missouri Badlands. The proposed project crosses this ecoregion east of TRNP near the U.S. Highway 85 corridor. Alternatives C, D, and E have the potential to affect undisturbed badland habitat. Disturbance to sensitive mammals can be minimized by using an existing corridor in this area and restricting activity from April 1 to July 1 when big horn sheep are giving birth.

These species are currently experiencing negative impacts from oil and gas development in North Dakota. Elk have been shown to avoid active oil and gas development areas (NDGFD 2011c). In 2010 approximately 296 and 548 acres within bighorn primary and secondary range, respectively, had been lost from the construction of well pads, an increase of 72 and 81 percent respectively, since 1995 (NDGFD, 2011c). The Department of Mineral Resources projects that up to 5,990 new wells will be drilled in oil fields encompassing bighorn range within the next 10 years (NDGFD, 2011c).

The areas along the Missouri River, Little Missouri River, and Lake Sakakawea are a primary golden eagle habitat area. By crossing the far upper end of this Missouri River habitat, the proposed project would avoid contributing to cumulative impacts on this species. Golden eagle electrocution rates are twice as frequent as bald eagles because of their propensity to perch on utility poles situated in grassland (NDGFD, 2011c). Additional power lines in the eagle range would increase the likelihood of eagle electrocutions. Avian protection design features would be incorporated into the design of the transmission line and associated facilities to minimize impacts on golden eagles, other raptors, and other types of birds. These features along with other avian BMPs would be described in Basin Electric's Avian Protection Plan.

Alternative Route C is expected to result in temporary disturbances of up to approximately 4,957 acres of vegetation during construction, permanent conversion of up to approximately 183 acres of forested vegetation to herbaceous vegetation, and permanent conversion of up to approximately 75 acres of vegetated land to transmission structure sites, substation sites, and a switchyard. Alternative Route D is expected to result in temporary disturbances of up to approximately 4,459 acres of vegetation during construction, permanent conversion of up to approximately 120 acres of forested vegetation to herbaceous vegetation, and permanent conversion of up to approximately 86 acres of vegetated land to transmission structure sites, substation sites, and a switchyard. Alternative Route E is expected to result in temporary disturbances of up to approximately 5,597 acres of vegetation during construction, permanent conversion of up to approximately 189 acres of forested vegetation to herbaceous vegetation, and permanent conversion of up to approximately 88 acres of vegetated land to transmission structure sites, substation sites, and a switchyard.

The proposed project would cause an increase in habitat fragmentation and edge effects, but this increase is expected to be slight due to the overall homogeneity of the ROW. The proposed project would cause some temporary and permanent displacement of wildlife into adjacent habitats and may result in an increase in vehicular-related mortality during the construction period. However, the proposed project is not expected to contribute significantly to the cumulative effects on wildlife given the scale of other development activities and the mitigation measures proposed for this project. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on wildlife are likely to occur from additional development in the area; however, the project's contribution to these impacts is expected to be minimal.

Special Status Species

Black-footed Ferret—Black-footed ferrets are a federally listed endangered species that depend on prairie dog colonies as a source of food and shelter (USFWS, 1989). The black-footed ferret was thought to be extirpated in the wild from 1987 until 1991, when 49 captive animals were reintroduced into the wild in Wyoming. Since then, ferrets have been reintroduced into Montana, South Dakota, Colorado, and Arizona and are reproducing in the wild. The majority of unconfirmed sightings from North Dakota come from the southwest part of the state (USFWS, 2011c). There are no confirmed reports of black-footed ferrets in North Dakota and there are no known prairie dog towns (primary habitat for the species) near the proposed project; therefore, impacts of any kind are unlikely. The proposed project is not expected to have direct cumulative effects on the black-footed ferret. Because the proposed project would facilitate further development in the study area, it may have the indirect effect of making future reintroduction of black-footed ferrets in this region of North Dakota non-viable.

Dakota Skipper—No known populations of Dakota skipper or suitable habitat occur within the area evaluated in the BA.[6] The proposed project is not expected to add further cumulative stressors to the species during its implementation as a result of increased noise, direct impacts, or other factors that may impact the species. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on Dakota skipper may occur; however, the project's contribution to these impacts is expected to be minimal.

[6] The Biological Assessment evaluates impacts to different species within a specified "action area." The size of these action areas are specific to each species, but in general are similar to the area encompassing the ROW. For more information on the action area evaluated for each species, please refer to Biological Assessment for the AVS to Neset Transmission Project.

<u>Gray Wolf</u>—Historically, the gray wolf occurred throughout the lower 48 U.S. states except for the southeast and the deserts of the southwest (USFWS, 2011d). The gray wolf was listed as endangered on March 9, 1978, in the lower 48 U.S. states (except Minnesota) (USFWS, 1987). In North Dakota, the gray wolf has been recently de-listed in the region east of the Missouri River from the South Dakota border to Lake Sakakawea and east of the center line of U.S. Highway 83 to the Canadian border. There are no known wolf packs or breeding groups in North Dakota. Wolves seen in North Dakota are likely animals dispersing from established populations in Minnesota and Canada (USFWS, 2012d). Wolves from these areas would have crossed under hundreds of over-head transmission lines of different sizes and configurations if they were to be found within the area evaluated in the BA; therefore, it appears that there are no known limitations to movement from transmission lines on wolves. No direct cumulative effects to wolves are anticipated. However, since the proposed project would facilitate further development in the study area, it may have the indirect effect of inhibiting gray wolf dispersal to and colonization of North Dakota.

<u>Interior Least Tern</u>—Historically, the least tern was found on the Atlantic, Gulf of Mexico, and California coasts and on the Mississippi, Missouri, and Rio Grande river systems. It was found throughout the Missouri River system in North Dakota. The interior population of the least tern presently breeds in the Mississippi, Missouri, and Rio Grande river systems. The interior population of least terns was listed as endangered on June 27, 1985 (USFWS, 1990). Nesting least terns mainly use sandbars within the free flowing sections of the Missouri and Yellowstone rivers in North Dakota and to a lesser extent, islands and shorelines of both Missouri River reservoirs (Lake Sakakawea and Lake Oahe) in North Dakota (USFWS 1990, 2011e). Habitat for this species in the proposed ROW would be limited to the area that crosses the Missouri River west of Williston, which is also designated critical habitat for the piping plover. The proposed project crosses the Missouri River, the only suitable habitat for the species along the route, just upstream of the U.S. Highway 85 bridge crossing and an existing transmission line crossing. The bridge, as currently built, can act as a dam and pool water behind it during high flows. In addition, the bridge funnels water through one set opening and prevents the river from naturally migrating and forming sandbars and side channels. Regular car and truck traffic over the bridge contribute to the current ambient noise levels and other human impacts. The proposed project would have line markings at the river crossing, minimizing any further potential for collision risk to the species when compared to what is already in place from the existing line crossing. The proposed project area does not currently have any potential nesting structure (i.e., bare sand islands) near it and the closest nesting recently was in 1994, approximately 5 miles downstream (Western EcoSystems Technology, 2013). The proposed project would not result in further impacts to the channel configuration and flow, noise levels, or other human impacts to the species. No significant direct cumulative effects to the least tern are anticipated. Conditions and mitigation measures imposed by USFWS, such as restricting construction during the nesting season would eliminate or substantially reduce any potential direct cumulative effects on this species. However, since the proposed project would facilitate further development in the study

area, indirect impacts on interior least tern may occur from development in the area. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on piping plover may occur; however, the project's contribution to these impacts is expected to be minimal.

Pallid Sturgeon—Alternative Routes C, D, and E cross the Missouri River, known habitat for the pallid sturgeon, while paralleling U.S. Highway 85 near Williston. Habitat for the pallid sturgeon within the study area includes the upper reaches of the Missouri River and backwater floodplain areas. Impacts on sturgeon habitat are expected to be minimal and limited to sedimentation not controlled by implementation of BMPs. Therefore, the proposed project is expected to have minimal direct cumulative effects on pallid sturgeon. However, because the proposed project would facilitate further development in the study area, indirect cumulative impacts on pallid sturgeon may occur, but the project's contribution to these impacts is expected to be minimal.

Piping Plover—The proposed project crosses the Missouri River just upstream of the U.S. Highway 85 bridge crossing and an existing transmission line crossing. This is the main area of suitable piping plover habitat crossed by the proposed project, but other wetland areas greater than 3 hectares are also crossed or within the area evaluated in the BA that could be suitable habitat under various water regimes (e.g., during dry years when bare beach/bar is exposed). The bridge as currently built can act as a dam and pool water behind it during high flows. In addition, the bridge funnels water through one set opening and prevents the river from naturally migrating and forming sandbars and side channels. Regular car and truck traffic over the bridge contributes to the current ambient noise levels and other human impacts. The proposed project would not place any poles within wetlands or the Missouri River or other river, minimizing potential impacts on piping plovers. The proposed project would have line markings near all wetland areas, minimizing any potential for collision risk to the species when compared to what is already in place from the existing line crossing over the Missouri River and other lines in the region. The proposed project area does not currently contain any potential nesting structures (i.e., bare sand islands) at the Missouri River crossing and there has been no known nesting near the line in other locations. The proposed project would not result in further impacts on the channel configuration at the Missouri River, would not place structures in wetlands, and would not contribute to increased noise levels or other human impacts on the species. No significant cumulative effects to the piping plover are anticipated. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on piping plover may occur; however, the project's contribution to these impacts is expected to be minimal.

Alternative Routes C, D, and E each contain 64.8 acres of critical habitat within the ROW for the piping plover. The proposed Project crosses the Missouri River, an area of designated critical habitat, just upstream of the U.S. Highway 85 bridge crossing and an existing transmission line crossing. While the project is within the overall boundary of designated critical habitat for the piping plover, no structures will be placed in any of the primary constituent elements of critical habitat. As currently delineated, the critical habitat for the Missouri River includes all areas within the floodplain, including trees, farms, roads, and other areas of "non-habitat". Given the location of the proposed Project in relation to the Highway 85 bridge, the river through this area is largely confined to the current channels, and while a sandbar may form within the current open water channel it is unlikely that the river will migrate extensively. The proposed project will not result in further impacts to the floodplain in this area. No other areas of critical habitat are near the area evaluated in the BA. No significant cumulative effects are anticipated to piping plover critical habitat.

<u>Sprague's Pipit</u>—Suitable habitat for Sprague's pipit may occur within the proposed ROW in areas of native prairie. The Sprague's pipit population has been declining throughout their range, but more so in Canada than in the United States. Within the proposed project region (western North Dakota) and within the area evaluated in the BA, significant oil and gas development, infrastructure to advance this development, and agriculture have historically and currently impacted suitable habitat for the species. Sprague's pipits are most susceptible to habitat fragmentation. While it is unknown if transmission line poles cause displacement, the wide spacing and overall small footprint of each structure would minimize the potential for displacement impacts. No established road would be maintained between structures, and any temporary impacts would be returned to their native state quickly through natural seed bank and sod maintenance. The addition of corona should not add considerably to the natural sound levels when pipits are actively calling and establishing territories given most corona noise occurs during rain/snow conditions.

The addition of the proposed project would result in one additional hazard to the Sprague's pipit population during their nesting period in North Dakota and spring and fall migrations, but with implementation of the line marking, this cumulative effect would be minimized. Conditions and mitigation measures imposed by USFWS and USFS or outlined in Basin Electric's Avian Protection Plan would eliminate or substantially reduce any direct cumulative effects on this species. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on Sprague's pipit may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Whooping Crane</u>—The Aransas-Wood Buffalo population of whooping cranes has been steadily increasing since a low of 15 in the 1940s to a population of nearly 300 in 2011 (Western EcoSystems Technology, 2013). However, even with this increase the population is far below the population level needed for recovery (Western, 2013). This increase in population occurred under the current conditions of existing transmission lines and distribution lines and other hazards within the species migratory corridor. Although critical habitat for the whooping crane has not been designated in North Dakota; much of the study area is within the whooping crane migration corridor and contains habitat types that whooping cranes use for foraging and roosting.

This migration corridor provides the area within which whooping cranes can be expected to occur during spring and fall migration periods. While crane occurrence at any particular location within the corridor would vary from year to year based on weather conditions and associated availability of water, wetlands, and crop stages, over time, the greatest crane occurrence and use would trend toward the core of the migration corridor. Approximately 278, 251, and 314 miles of Alternative Routes C, D, and E, respectively, lie within the migration corridor. The greatest potential for interaction with the proposed project would occur where areas identified as wetland stop-over habitat (staging areas) are located between the transmission line and agricultural lands used as foraging areas. Existing transmission lines in Williams County, especially in the Missouri Coteau Slope Ecoregion on the edge of the prairie pothole region, may be having effects on the whooping crane. The addition of the proposed project would result in one additional hazard to the whooping crane population during their spring and fall migrations, but with implementation of line marking, this cumulative effect would be minimized. Conservation and minimization measures imposed by USFWS would eliminate or substantially reduce any direct cumulative effects on this species. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on whooping may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Northern Long-eared Bat</u>—This medium-sized bat (3 to 3.7 inches long) is insectivorous and uses different roost sites during different seasons. In winter, the northern long-eared bat typically hibernates in caves and mines, and in the summer months, it relies less on caves and more on old growth and late successional forests for roosts and reproduction. During the summer, bats roost under the bark of dead and dying trees. Old and mature forests provide habitat (decaying trees, loose bark, tree snags, and stumps) for roosting, feeding, and maternity colonies of northern long-eared bats. In addition, the northern long-eared bat is also known to roost in buildings (NatureServe, 2013; USFWS, 2013). The northern long-eared bat is a generalist predator of aerial invertebrates (Center for Biological Diversity, 2010; NatureServe, 2013). It forages at night in forested areas, riparian zones, along forest edges, and in clearings. In the Badlands region of South Dakota, this species is known to forage in wooded riparian zones in lower elevations and in dense forest at higher elevations (Center for Biological Diversity, 2010). To decrease direct impacts on the species during construction, proposed construction activities within 1,000 feet of suitable hibernacula would be avoided during the winter hibernation period (roughly late fall to early spring). Suitable hibernacula include caves and mines meeting the typical description given in the proposed listing (i.e., large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents [USFWS 2013d]). In addition to avoiding hibernacula during construction, all mature, dead, or dying trees would be left intact, where not a safety concern for line reliability. This may help to protect foraging, roosting, and maternity sites. Within the proposed project region (North Dakota), significant coal, oil, and gas development; infrastructure to advance this development; and agriculture have historically and currently impacted the forested and riparian habitat that the northern long-eared bat uses for foraging and roosting. North Dakota has no known hibernacula

to date, but in other areas of the country human disturbance of hibernacula and hibernating bats also continue to threaten populations. Such disturbance occurs in the form of cave commercialization, recreational caving, vandalism, and research-related activities. The species is also susceptible to White Nose Syndrome. Climate change is also expected to impact the northern long-eared bat, although these effects are not well understood. Climate change models have been used to investigate the range expansion of the little brown bat; such range shifts could also be used to predict the range shifts of other bat species (Humphries et al., 2002). While it is unknown if transmission line poles cause displacement, the proper siting of each structure, away from foraging, roosting, and hibernacula sites would minimize the potential for displacement impacts. The addition of corona should not add considerably to the natural sound levels when bats are flying, because most corona effect noise occurs during rain/snow. Since the proposed project would facilitate further development in the study area, indirect cumulative impacts on northern long-nosed bat may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Baird's Sparrow</u>—Baird's sparrow is a smallish bird that lives almost exclusively in native prairie areas within the northern Great Plains. Habitat for Baird's sparrows is found in the northwestern and the east-central parts of the North Dakota (Missouri Coteau). Baird's sparrows can also be found nesting east of the Lake Sakakawea/Missouri River area (USFWS, 2012h). Suitable habitat for Baird's sparrow may occur within the proposed ROW in areas of native prairie in the LMNG. It is expected that conditions and mitigation measures imposed by USFS in the SUP and outlined in Basin Electric's Avian Protection Plan will eliminate or substantially reduce any direct cumulative effects on this species. The proposed project, in combination with other development projects in the region, increases the potential for loss of individuals of sensitive bird species due to the increase risk of collision with the proposed transmission line and other development structures on the LMNG and in the region. To minimize the potential for loss, Basin Electric has designed the proposed project to meet the requirements for the protection of avian species from electrocution and line strikes according to the guidelines in APLIC's "Reducing Avian Collisions with Power Lines: The State of the Art in 2012" (APLIC, 2012). In addition, sensitive species that have been threatened by loss of grassland habitat, including Baird's sparrow, would continue to lose habitat in the region as a result of the various development projects; however, the contribution of the proposed project to grassland habitat loss on the LMNG would be minimal. It is expected that conditions and mitigation measures imposed by USFS in the SUP and outlined in Basin Electric's Avian Protection Plan will eliminate or substantially reduce any direct cumulative effects on this species. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on Baird's sparrow may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Bald Eagle</u>—Bald eagles historically occurred throughout the United States and Canada, but experienced a dramatic population decline between the 1870s and the 1970s. Populations have

since rebounded and there are breeding populations in all of the lower 48 states and Alaska (USFWS, 2007d). Nesting and foraging habitat may exist for the bald eagle within the proposed ROW, especially in the vicinity of the Missouri River crossing. The proposed project, in combination with other development projects in the region, increases the potential for loss of individuals of sensitive bird species due to the increase risk of collision with the proposed transmission line and other development structures on the LMNG and in the region. To minimize the potential for loss, Basin Electric has designed the proposed project to meet the requirements for the protection of avian species from electrocution and line strikes according to the APLIC guidelines (APLIC, 2006). In addition, sensitive species that have been threatened by loss of grassland habitat, including the bald eagle, would continue to lose habitat in the region as a result of the various development projects; however, the contribution of the proposed project to grassland habitat loss on the LMNG would be minimal. It is expected that conditions and mitigation measures imposed by USFS in the SUP and outlined in Basin Electric's Avian Protection Plan will eliminate or substantially reduce any direct cumulative effects on this species. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on bald eagles may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Burrowing Owl</u>—The western burrowing owl is a grassland specialist distributed throughout western North America, primarily in open areas with short vegetation. It is known to occur in the LMNG and could occur in native and non-native grasslands in the proposed ROW (USFS, 2002). It is expected that conditions and mitigation measures imposed by USFS in the SUP and outlined in Basin Electric's Avian Protection Plan will eliminate or substantially reduce any direct cumulative effects on this species from the proposed project. Sensitive species that have been threatened by loss of grassland habitat, including the burrowing owl, would continue to lose habitat in the region as a result of the various development projects; however, the contribution of the proposed project to grassland habitat loss on the LMNG would be minimal. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on burrowing owl may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Greater Prairie-chicken</u>—Greater prairie-chickens are endemic to the grassland habitats of the central and eastern United States. Breeding populations of greater prairie chicken are known from Grand Forks County and Sheyenne National Grasslands in North Dakota (USFWS, 2012i). Since the greater prairie-chicken is not known from the project counties, no direct or indirect cumulative effects are expected. However, it is expected that conditions and mitigation measures imposed by USFS in the SUP and outlined in Basin Electric's Avian Protection Plan will eliminate or substantially reduce any direct cumulative effects on this species if it is present in the proposed ROW. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on greater prairie-chicken may occur; however, the project's contribution to these impacts is expected to be minimal.

Plains Sharp-tailed Grouse—Sharp-tailed grouse inhabit high-structure grasslands from Alaska east to Hudson Bay and south to Utah, northeastern New Mexico, and Michigan. The plains sharp-tailed grouse is a MIS for high-structure grasslands in the LMNG in the northern region and may occur in grasslands within the proposed ROW (USFS, 2001). It is expected that conditions and mitigation measures imposed by USFS in the SUP and outlined in Basin Electric's Avian Protection Plan would eliminate or substantially reduce any direct cumulative effects on this species from the proposed project. Sensitive species that have been threatened by loss of grassland habitat, including the plains sharp-tailed grouse, would continue to lose habitat in the region as a result of the various development projects; however, the contribution of the proposed project to grassland habitat loss on the LMNG would be minimal. Currently NDGFD is conducting a research study to understand the impacts of oil and gas development on the ecology of sharp-tailed grouse, to ensure the future of grouse populations in North Dakota (NDGFD, 2011c). Additional negative effects impacting grouse include increased loss of the Conservation Reserve Program, conversion of native grasslands, potential impacts of wind development, and over-utilization of grasslands by livestock producers (NDGFD, 2011c). Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on plains sharp-tailed grouse may occur; however, the project's contribution to these impacts is expected to be minimal.

Greater Sage-grouse—The greater sage-grouse is an obligate user of several species of sagebrush. Sage-grouse is only known or believed to occur in North Dakota in Bowman, Golden Valley, and Slope counties (USFWS, 2012j). Therefore, no direct or indirect effects on sage-grouse are expected. However, conditions and mitigation measures imposed by USFWS and USFS, and outlined in Basin Electric's Avian Protection Plan would eliminate or substantially reduce any direct cumulative effects on this species if it is present in the proposed ROW. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on greater sage-grouse may occur; however, the project's contribution to these impacts is expected to be minimal.

Loggerhead Shrike—Loggerhead shrikes occupy a wide variety of open habitats including native and non-native grasslands, sage scrub, and other areas with a sparse coverage of bushes and trees and bare ground. Loggerhead shrikes are known to breed throughout North Dakota and are fairly common throughout the state, except in the Red River Valley (USGS, 1995). The proposed project, in combination with other development projects in the region, would increase the potential for loss of individuals of sensitive bird species due to the increased risk of collision with the proposed transmission line and other development structures on the LMNG and in the region. To minimize the potential for loss, Basin Electric has designed the proposed project to meet the requirements for the protection of avian species from electrocution and line strikes according to the APLIC guidelines (APLIC, 2006). In addition, sensitive species that have been threatened by loss of grassland habitat, including the loggerhead shrike, would continue to lose habitat in the region as a result of the various development projects; however, the contribution of the proposed project to grassland habitat loss on the LMNG would be minimal. Conditions and mitigation measures imposed by USFS in the SUP and outlined in Basin Electric's Avian Protection Plan would eliminate or substantially reduce any direct cumulative effects on this species. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on loggerhead shrike may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Long-billed Curlew</u>—The long-billed curlew is the largest North American shorebird. It is known to breed in southwestern North Dakota, but is considered uncommon (USGS, 2006a). The proposed project, in combination with other development projects in the region, would increase the potential for loss of individuals of sensitive bird species due to the increased risk of collision with the proposed transmission line and other development structures on the LMNG and in the region. To minimize the potential for loss, Basin Electric has designed the proposed project to meet the requirements for the protection of avian species from electrocution and line strikes according to APLIC guidelines (APLIC, 2006). In addition, sensitive species that have been threatened by loss of grassland habitat, including the long-billed curlew, would continue to lose habitat in the region as a result of the various development projects; however, the contribution of the proposed project to grassland habitat loss on the LMNG would be minimal. Conditions and mitigation measures imposed by USFS in the SUP and outlined in Basin Electric's Avian Protection Plan would eliminate or substantially reduce any direct cumulative effects on this species. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on loggerhead shrike may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Black-tailed Prairie Dog</u>—The black-tailed prairie dog is a small, stout ground squirrel that several species, including the endangered black-footed ferret, depend on to varying degrees for food and shelter. The black-tailed prairie dog is a MIS for low-structure grasslands in the LMNG Northern Region and may occur in grasslands within the proposed ROW (USFS, 2001). Sensitive species that have been threatened by loss of grassland habitat, including the black-tailed prairie dog, would continue to lose habitat in the region as a result of the various development projects; however, the contribution of the proposed project to grassland habitat loss on the LMNG would be minimal. Conditions and mitigation measures imposed by USFS in the SUP would eliminate or substantially reduce any direct cumulative effects on this species. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on black-tailed prairie dog may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Bighorn Sheep</u>—Bighorn sheep are found in the badlands area of North Dakota and within the LMNG. Conditions and mitigation measures imposed by NDGFD or USFS in the SUP would eliminate or substantially reduce any direct cumulative effects on this species. Additional negative influences on bighorn sheep include fire suppression, forest encroachment, home

development, recreational trail construction, disease from domestic sheep and goats, predation, and competition with livestock, as well as an increasing human population, due in part to oil and gas development (NDGFD, 2011c). Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on bighorn sheep may occur; however, the project's contribution to these impacts is expected to be minimal.

Arogos Skipper—The Arogos skipper is known to occur in Ward County in western North Dakota and Ransom and Richland counties in eastern North Dakota (USGS, 2006c). It is not known to occur in the project counties; therefore, no direct or indirect cumulative effects are expected. However, conditions and mitigation measures imposed by USFS in the SUP would eliminate or substantially reduce any direct cumulative effects on this species if it is present in the proposed ROW. Sensitive species that have been threatened by loss of grassland habitat, including the Arogos skipper, would continue to lose habitat in the region as a result of the various development projects; however, the contribution of the proposed project to grassland habitat loss on the LMNG would be minimal. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on Arogos skipper may occur; however, the project's contribution to these impacts is expected to be minimal.

Broad-winged Skipper—The broad-winged skipper is known to occur in Ransom and Richland Counties in eastern North Dakota (USGS, 2006c). It is not known to occur in the project counties; therefore, no direct or indirect cumulative effects are expected. However, conditions and mitigation measures imposed by USFS in the SUP would eliminate or substantially reduce any direct cumulative effects on this species if it is present in the proposed ROW. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on broad-winged skipper may occur; however, the project's contribution to these impacts is expected to be minimal.

Dion Skipper—The Dion skipper is known to occur in Ransom and Richland counties in eastern North Dakota (USGS, 2006c). It is not known to occur in the project counties; therefore, no direct or indirect cumulative effects are expected. However, conditions and mitigation measures imposed by USFS in the SUP would eliminate or substantially reduce any direct cumulative effects on this species if it is present in the proposed ROW. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on Dion skipper may occur; however, the project's contribution to these impacts is expected to be minimal.

Mulberry Wing—The mulberry wing is known to occur in Cass, Ransom, Richland, and Sargent counties in eastern North Dakota (USGS, 2006c). It is not known to occur in the project counties; therefore, no direct or indirect cumulative effects are expected. However, conditions and mitigation measures imposed by USFS in the SUP would eliminate or substantially reduce any direct cumulative effects on this species if it is present in the proposed ROW. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on mulberry wing may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Ottoe Skipper</u>—The Ottoe skipper is known to occur in Williams, McKenzie, Billings, Beach, Slope, Dunn, Ward, and Oliver counties in western North Dakota (USGS, 2006c). It is expected that conditions and mitigation measures imposed by USFS in the SUP would eliminate or substantially reduce direct cumulative effects on this species. Sensitive species that have been threatened by loss of grassland habitat, including the Ottoe skipper, would continue to lose habitat in the region as a result of the various development projects; however, the contribution of the proposed project to grassland habitat loss on the LMNG would be minimal. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on Ottoe skipper may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Powesheik Skipper</u>—In North Dakota, the Powesheik skipper is only known from the eastern portion of the state (USFWS, 2010b). Therefore, no direct or indirect cumulative effects on the Powesheik skipper are anticipated. However, conditions and mitigation measures imposed by USFWS and USFS would eliminate or substantially reduce any direct cumulative effects on this species if it is present in the proposed ROW. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on Powesheik skipper may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Regal Fritillary</u>—The regal fritillary is known in North Dakota from mostly southern counties, but is not known from the project counties (USGS, 2006b). Therefore, no direct or indirect cumulative effects on the regal fritillary are anticipated. However, conditions and mitigation measures imposed by USFS in the SUP would eliminate or substantially reduce any direct cumulative effects on this species if it is present in the proposed ROW. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on regal fritillary may occur; however, the project's contribution to these impacts is expected to be minimal.

<u>Tawny Crescent</u>—The tawny crescent is known from several eastern, northern, and western counties in North Dakota, including the project counties of Dunn and McKenzie (USGS, 2006c). Conditions and mitigation measures imposed by USFS in the SUP would eliminate or substantially reduce any direct cumulative effects on this species. Sensitive species that have been threatened by loss of grassland habitat, including the tawny crescent, would continue to lose habitat in the region as a result of the various development projects; however, the contribution of the proposed project to grassland habitat loss on the LMNG would be minimal. Because the proposed project would facilitate further development in the study area, indirect cumulative impacts on tawny crescent may occur; however, the project's contribution to these impacts is expected to be minimal.

4.4.6 Cultural Resources

The construction of the proposed project transmission line facilities could affect recorded and currently unknown cultural resources within the study area. The transmission line, with its pole installation and substation modification, has the potential to disturb archaeological sites. The project could alter the setting and viewsheds of historic structures or landscapes, or the setting of and access to traditional cultural properties. Due to the localized effect on cultural resources through siting of the transmission line structures and substation modifications, the spatial boundary for the cumulative effects analysis is defined as the APE, as discussed in Section 3.6.1 of the DEIS. The temporal boundary for the cumulative effects analysis is defined as the lifetime of the project. For all projects involving construction or subsurface activities, which are yet to be determined, unrecorded archaeological sites or traditional cultural properties may be disturbed. Cumulative loss of cultural resources would occur if archaeological sites or traditional cultural properties are disturbed on multiple sites.

Historic buildings or other sites may be impacted, as well, in that construction of structures may impact the historic viewshed in which above-ground archaeological and historic resources are located. Impacts on cultural resources, including historic structures, archaeological sites, and traditional cultural properties, would be considered significant if they result in adverse effects on historic properties that are eligible for listing on the NRHP. Cumulative effects would consist of a loss of cultural resources to the area. Research on completed and ongoing projects in the vicinity of Alternatives C, D, and E that require subsurface disturbance is in progress.

In addition to the potential project impacts, the principal types of impacts that other projects could have on cultural resources include physical destruction or damage caused by pipeline trenching, related excavations, or boring; introduction of visual, atmospheric, or audible elements during construction that diminish the integrity of the property’s significant historic features by short-term pipeline construction or construction of aboveground appurtenant facilities and roads; and change of the character of the property’s use or of physical features within the property’s setting that contribute to its significance. Further evaluation and cultural resource surveys would be completed prior to the Final EIS, and a final determination of impacts on cultural resources would be made. The results of these evaluations and surveys would be used by Basin Electric to determine the final alignment of the transmission line to avoid, minimize, and/or mitigate impacts on cultural resources likely to be caused by the construction and operation of the transmission line.

4.4.7 Land Use

Alternative C would avoid all USFWS easements and would not contribute to cumulative effects to those properties. A major land use concern of the federal agencies is the protection of TRNP-North Unit, and the Lone Butte Management Area of the LMNG. Alternative C would be located outside of TRNP-North Unit. The Lone Butte Management Area is southeast of the national park and east of the USFS Summit campground on U.S. Highway 85. Lone Butte was not allocated to Management Area 1.2, Suitable for Wilderness, in the 2002 Land and Resource Management Plan for the Dakota Prairie National Grasslands. However, based on scoping comments the proposed Alternative C has been modified to be outside of the Lone Butte Management Area. Alternative C avoids the Long X Divide Management Area west of U.S. Highway 85 and south of TRNP, which was allocated to Management Area 1.2 in the Land and Resource Management Plan.

In addition to the transmission line, the BakkenLink pipeline follows the U.S. Highway 85 corridor. Thus, Alternative Route C has the potential to cumulatively affect resources in the area along U.S. Highway 85. About 147 acres of transmission line ROW would be added to other pipeline and transmission line ROW commitments at the LMNG. The eastern segment of Alternative C would cross the Little Missouri River in the same general area as the Northern Border Pipeline and McKenzie Electric Power Cooperative's 115-kV transmission line. As a result, the western segment of Alternative C would create a new corridor across the Little Missouri River, while the eastern segment would cumulatively affect land resources where it crosses the Little Missouri River.

Similar to Alternative C, Alternative D would avoid all USFWS easements and would not contribute to cumulative effects to those properties. Alternative D would avoid the two LMNG grassland management units, but would traverse the same general area as the Northern Border Pipeline and McKenzie Electric Power Cooperative's 115-kV transmission line near the Little Missouri River Crossing. Thus, Alternative D would not create a new corridor across the Little Missouri River; however, it would cumulatively affect land resources in that area.

Alternative E would follow generally the same route as Alternative D. The major difference between these two alternatives would be the construction of two parallel 345/345-kV lines north of Killdeer for 63 miles under Alternative E. The cumulative impacts on land use from Alternative E would therefore be identical to those described for Alternative D, above.

The BakkenLink Pipeline, Bear Paw Energy natural gas liquids pipeline, and Western's Charlie Creek-Williston transmission line also cross the LMNG. The cumulative effect of these three linear projects, along with the proposed project, on national forest system lands would be about 500 acres. Increased development in the area of cities, including new housing construction, is likely contributing to increased conversion of undeveloped land and associated impacts on terrestrial habitat and farmland. Similarly, the increased oil and gas development and processing plants are converting terrestrial habitat and farmland. The proposed project would be built to respond to this additional development and would not by itself contribute to adverse cumulative land use impacts. The cities and industrial developers would likely find another source of electric power, such as self-generation, if the proposed action were not built. Overall cumulative impacts on land use from Alternatives C, D, and E are expected to be low.

4.4.8 Socioeconomics

Cumulative impacts would be the same under Alternatives C, D, and E.

Continued rapid oil and gas development in the area (1,500 new wells per year), as well as development and/or upgrading of pipelines, gathering systems, gas processing facilities, rail terminals, power plants, water and transportation infrastructure, transmission lines, and community developments will all require construction workforce in the project area. These employment opportunities would help keep unemployment rates and poverty levels relatively low and contribute to increased average earnings. Increasing oil and gas production also brings fiscal revenues to state and local governments, which are imperative as municipalities and counties try to accommodate this growth with increasing demands for local services and infrastructure. Workers spending their earnings in the region also support sales tax receipts for local governments. The cumulative impact of the proposed project associated with unemployment and fiscal receipts would be low, short term, and beneficial.

The number of construction workers needed for all of these cumulative projects, along with those required for the proposed project, would add to stresses on services and infrastructure, notably housing, road maintenance, public services, and service industries (e.g., retail, food and beverage, gas stations, etc.). However, some community development, particularly those that provide affordable housing, would help alleviate some of these shortages. Municipal and county services, including public service provisions such as education, road maintenance and construction, law enforcement, judicial facilities and services, medical services and facilities, emergency services, and other social services can all be expected to increase driven by the growing workforce and population, even if it is temporary in nature. Additionally, with average earnings being driven up by higher-paying oil industry jobs, service sectors and other local salaries also rise to compete with the oil sector salaries often causing financial stresses for small businesses. With the influx of population and workforce, often there are not sufficient supplies to meet demand in stores, gas pumps, and restaurants, among others, so establishments can increase local prices affecting the cost of living in the area.

Construction jobs associated with the proposed project would result in a short-term impact on communities in and near where construction activities are ongoing. Permanent residential increases in these areas are not expected to directly result from the proposed project. However, during the construction period, cumulative impacts associated with the proposed project on infrastructure, public services, cost of living, and housing are expected to be moderate, short term, and adverse.

Property values could be adversely affected by development of other transmission lines, oil and gas wells, and other transportation and industrial facilities. However, royalties from oil and gas production could also increase property values. In addition, housing development and availability could also have an effect on property values. Because there would be low adverse effects expected to property values associated with the transmission line, cumulative impacts would also be low, with variable, individualized, and unpredictable impacts on property values.

The proposed project would bring electrical power and reliability to northwestern North Dakota to support needed infrastructure and business construction and development associated with the rapid oil and gas boom in the project area. Without the proposed project to strengthen the electrical system, electricity capacity shortfall would likely impact the existing system and limit future development activities needed to accommodate the considerable population and business growth in the area. The proposed project would provide electricity needs, with beneficial, long-term cumulative impacts on the economic development of the region.

4.4.9 Environmental Justice

The proposed project would not have any disproportionate impacts on minority and/or low-income communities, and therefore would not contribute to any disproportionate cumulative impacts.

4.4.10 Recreation and Tourism

Under Alternatives C, D, and E, the proposed project would avoid the TRNP and the Lone Butte and Long X Divide management areas of the LMNG. Therefore, it would not be expected to have any cumulative impacts on recreational use of those areas. The proposed project also would not displace any developed recreational or park uses. Alternative C would pass within about 0.5 mile of one USFS campground (Summit Campground), located adjacent to U.S. Highway 85 about 3.5 miles south of TRNP, and construction noise and dust could temporarily create cumulative impacts to campground use. Temporary construction workers may use public RV parks during the construction period. The proposed project would only temporarily affect recreational uses such as hunting, hiking, and wildlife observation on private lands.

All three of the alternatives would involve crossing the Little Missouri River and the Missouri River, which could have cumulative impacts on recreation. Alternatives D and E and the eastern segment of Alternative C would each cross the Little Missouri River in the same general area as the Northern Border Pipeline and McKenzie Electric Power Cooperative's 115-kV transmission line. While impacts would occur during construction, it is anticipated that in the long term, recreational access and use of the river would return to pre-construction levels. The major area with potential for cumulative recreational impacts would be the crossing of the Missouri River, in the Lewis and Clark WMA, where additional lands would be added to ROW adjacent to U.S. Highway 85. Since the crossing would be adjacent to the existing U.S. Highway 85 crossing, within a utility corridor containing the existing Western transmission line and a rural water pipeline, the usability of these lands for recreation is limited. Impacts would likely be temporary, and the area would be available for use after construction. Thus, no adverse cumulative effects on recreation are anticipated as a result of this project under Alternatives C, D, or E.

4.4.11 Utility and Transportation Infrastructure

Potential cumulative impacts would be similar for each alternative.

The increase in oil and gas-related activity in and around the project area has placed additional demand on both utility and transportation infrastructure. The ability for the oil and gas industry to grow is directly linked to an infrastructure network that is capable of accommodating this demand. There are numerous upgrades and improvements to utilities, such as transmission lines and pipelines, in and around the project area that are either planned or proposed to help support projected growth.

During construction of the proposed project, Basin Electric would work with municipal officials and other utility service providers to ensure, to the greatest extent possible, that power outages and brownouts do not occur. Such effects would temporarily interrupt the delivery of electric service to some residents and businesses. Basin Electric would work to repair any such effects as quickly as possible. Therefore, should adverse cumulative effects result, they would be of relatively short duration; the extent to which they would be borne is not known at this time. However, it is not anticipated that construction activities associated with the proposed project will result in adverse cumulative impacts to the continued delivery of utility services.

The potential for power outages and brownouts that would result from the failure to implement identified upgrades and improvements would increase. The proposed project in combination with other planned or proposed upgrades and improvements would help support the increase in oil and gas activity and also protect nearby residents and businesses from adverse effects should power outages occur. As a result, the proposed project would not contribute to adverse cumulative impacts to utility services.

The proposed project is not anticipated to have an effect on the continued delivery of other utility services such as water supply and treatment and wastewater disposal. Therefore, the proposed project would not contribute to cumulative impacts that may be borne by these resources from other projects in the area.

The increase in oil and gas production as well as population growth, either directly or indirectly related to the oil and gas industry, has placed additional demands on the transportation network (see Section 3.11.1 of the DEIS). During construction of the proposed project, heavy material haul trucks and road closures would result in the temporary disruption of traffic patterns. Such effects would be of relatively short duration and would be timed to the greatest extent possible to avoid peak travel periods. As a result, construction of the proposed project would result in temporary and localized adverse cumulative impacts to the transportation network.

The North Dakota Department of Transportation reports that truck volumes in project area counties have increased considerably over the past ten years (see Table 3-47 of the DEIS). Since the release of the DEIS, additional statistics have become available on traffic and fatal accident rates. While the national fatal accident rate has been steadily decreasing over the past 11 years (with the exception of 2012), the rate in North Dakota has fluctuated but remains consistently higher than that of the nation overall. In 2012, the fatal accident rate for the nation as a whole was 1.16. This number increased to 1.68 for North Dakota. Fatalities and traffic accidents have increased notably across project area counties over the past few years. Project area counties demonstrated an increase in the share of North Dakota accidents in almost every category between 2010 and 2012, as illustrated in Table 4-6. In Williams County, all classifications of traffic accidents (property damage only, injury, and fatality crashes) as a share of the North Dakota total increased notably.

Table 4-6: Traffic Accident Totals for Project Area Counties, 2010 and 2012

Crash Type and Percent of Statewide Total	County					
	Billings	Dunn	McKenzie	Mercer	Mountrail	Williams
2010						
# of Property Damage Only Crashes	36	126	165	146	189	701
% of North Dakota Total	0.3	0.9	1.2	1.1	1.4	5.1
# of Injury Crashes	4	16	49	29	62	179
% of North Dakota Total	0.1	0.5	1.5	0.9	1.9	5.4
# of Fatal Crashes	0	3	7	2	4	3
% of North Dakota Total	0	3.3	7.6	2.2	4.6	3.7
# of Total Fatalities	0	5	8	2	5	3
% of North Dakota Total	0	4.8	7.6	1.9	4.7	2.9
2012						
# of Property Damage Only Crashes	41	145	373	156	227	1,349
% of North Dakota Total	0.3	1.0	2.6	1.1	1.6	9.3
# of Injury Crashes	16	49	187	30	87	323
% of North Dakota Total	0.4	1.3	5.0	0.8	2.3	8.7
# of Fatal Crashes	1	2	18	2	5	24
% of North Dakota Total	0.7	1.4	12.2	1.4	3.4	16.3
# of Total Fatalities	1	2	19	2	5	27
% of North Dakota Total	0.6	1.2	11.2	1.2	2.9	15.9

Source: Table 3-50 of DEIS and North Dakota Department of Transportation, 2012

In a 2010 study, the Upper Great Plains Transportation Institute identified improvements to roadways maintained by either county or municipal governments that would be needed to support continued growth in the oil and gas industry (Upper Great Plains Transportation Institute, 2010). The North Dakota Department of Transportation in its five year transportation improvement plan identified a number of roadway improvements in the project area that are necessary. These projects may or may not be directly attributable to the oil and gas industry. One project being undertaken to support the growth of the oil and gas industry is the widening of U.S. Highway 85 from Watford City to Williston to a four-lane roadway. This project began earlier in 2013 (North Dakota Department of Transportation, 2013). Such improvements are independent of the proposed project, but would improve travel patterns in areas experiencing a decreasing level of service. Because the proposed project would not introduce new vehicles to the roadway network with the exception of periodic maintenance vehicles serving various locations along the proposed project alignment, it would not contribute to adverse cumulative impacts to the transportation network. The ongoing study to determine whether the Sloulin Field International Airport in the city of Williston will be expanded or relocated to accommodate increased traffic is expected to be complete in 2014. However, it is anticipated that the airport would be relocated. Should the airport remain in its current location, the introduction of the proposed project in areas adjacent to the airport would result in an obstruction as defined by the FAA. Approval from the FAA would be required to site the proposed project adjacent to the airport. Should the airport be relocated, there would be no obstruction as a result of the proposed project. A Determination of No Hazard to Air Navigation would be made.

The proposed project would not contribute to cumulative effects that may be borne by railroad facilities as a result of other activities or projects in the area.

4.4.12 Public Health and Safety

Vehicular volumes associated with the oil and gas industry and population growth directly and indirectly related to this activity has increased notably over the past 10 years. As demonstrated in Section 3.11.1 of the DEIS, accident rates have also increased. The construction of the proposed project would result in temporary disruptions to travel patterns associated with the movement of heavy material haul trucks and roadway closures. As a result, the proposed project has the potential to contribute to short-term, adverse cumulative impacts associated with travel patterns during construction. Basin Electric would work with appropriate agencies to design and implement a construction action plan that informs motorists of temporary changes in travel patterns and roadway signage necessary to minimize the potential for accidents to occur. Because the operation of the proposed project would result in the introduction of periodic maintenance vehicles to the roadway network and would not result in permanent road closures, it is not anticipated to contribute to adverse cumulative impacts that may result in public health and safety effects associated with accident rates.

As the proposed project is further refined, a construction action plan would be developed to protect the health and safety of both workers and others in the vicinity from the stringing of the transmission line and the disturbance and removal of hazardous materials should any be identified during construction activities. Any such effects are anticipated to be localized and would not contribute to cumulative public health and safety effects. Additionally, the proposed project would not contribute to adverse public health and safety impacts that may result from activities associated with the oil and gas industry or projects in the area such as chemical spills or pipeline failure.

The operation of the proposed project would introduce new EMF sources to the project area. As demonstrated in Section 3.12.1 of the DEIS and Section 3.12.2 of this document, EMFs resulting from the operation of the proposed project alternatives would be well below impact thresholds. Additionally, EMF levels would be reduced to negligible at a distance of 75 feet from the centerline of Alternatives C and D and 150 feet from the centerline of Alternative E, the extent of the ROW under each alternative. As a result, the proposed project alternatives would not contribute to adverse cumulative impacts associated with EMFs in the area. Because the proposed project alternatives would help support increased electrical demand, it would help ensure public health and safety by reducing the potential for power outages and brownouts.

4.4.13 Noise

Agriculture and community development activities have occurred and continue to occur in the project area, with the level of noise being localized and dependent on the activity and not significant in scale. Oil and gas development, gas processing plants, and new power plant development are contributing to community noise in rural areas where it has not been present in the past. Increased truck traffic associated with these developments is contributing to increased traffic noise in both rural and urban locations, with associated noise being localized. Based on the relatively minimal nature of operational noise, the proposed project would only temporarily contribute to these ongoing cumulative effects for a short time during construction and during routine maintenance activities; there would be no long-term cumulative noise impacts.

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5.0 COMPARISON OF ALTERNATIVES

5.1 COMPARATIVE IMPACTS OF ALTERNATIVES

Three alternatives (C, D, and E) and a no-action alternative were carried forward for analysis in this Supplemental DEIS. Comparative impacts for the alternatives are summarized in Table 5-1.

5.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible commitment of resources refers to the loss of future options for resource development or management, especially of nonrenewable resources such as cultural resources. Construction and operation of the proposed project would require the permanent conversion of 1.3 to 1.6 acres for the transmission line structures and 73 to 85 acres for new substations/switchyards. This would include federal, state, and private lands. Most of these areas are in agricultural production. The introduction of new transmission lines would permanently change the visual landscape in some areas. The construction of the project would require the irretrievable commitment of non-recyclable building materials and fuel consumed by construction equipment.

5.3 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

NEPA legislation requires that an EIS describe "the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity." Construction of the project would have short-term impacts on environmental resources associated with construction of the transmission line, including installation of structures, conductors, use of construction laydown areas, and use of the area as a transmission line ROW during the life span of the transmission line and its associated facilities. As indicated in the discussions of individual resource areas, the small permanent footprint of the transmission line and limited resource impacts indicate that operation of the facility would not likely affect regional natural resources to any significant degree. However, the land occupied by transmission structures would be an impact for the life of the transmission line, possibly exceeding 50 years. The proposed project would require development of 1.3 to 1.6 acres of land for the footprint of the transmission line structures and 73 to 85 acres to accommodate the five or six new proposed substations/switchyards. Additional land would be needed for transmission ROW and access trails.

Temporary impacts from construction activities are discussed in Chapter 3 and Table 5-1. The high voltage transmission line permit would require Basin Electric to restore the ROW, temporary work spaces, construction access trails, abandoned ROW, and other lands affected by construction of the project. During the restoration process, Basin Electric would work with landowners, NDGFD, USFS, and local wildlife management programs.

The estimated impacts on resources within the 150-foot ROW are show in Table 5-2. While the total acreage with in the ROW ranges from 4,957 to 5,597 acres, much of this area would be returned to its original productivity (croplands and grasslands) once the transmission line is constructed and operational. A minimal number of acres across the entire line would be permanently removed from productivity due to the placement of structures and facilities.

Table 5-2: Estimated Long-term Impacts on Resources within the 150-foot ROW and Related Facilities

Resource	Alternative C	Alternative D	Alternative E
ROW (acres)	4,957	4,459	5,597
Croplands (acres)	1,671	1,505	1,719
Grasslands (acres)	2,548	2,408	3,155
Soils and/or rock (cubic feet)	2.4 million	2.2 million	2.7 million
LMNG (acres)	153	57	57

Construction and operation of the project would result in long-term impacts on vegetation, limited to the permanent conversion of vegetated lands to utility land uses (transmission structures, substations, and switchyards), conversion of forested or wooded vegetated cover to herbaceous cover, and disturbance related to maintenance activities (mowing, herbicide application, tree trimming, and dangerous tree removal). Long-term (permanent) impacts would also accrue to prime and important farmland soils where transmission line structures are placed within the proposed ROW. However, these losses would constitute a small fraction of total lands within the proposed project ROW. These resources would not return to productive, pre-disturbance conditions until the transmission line and associated facilities are removed. Although wetlands would be avoided, if conversion is necessary, impacts could be mitigated through reclamation, restoration, or permanently protecting other wetlands for an offset of wetland losses. For all other resource areas identified in this Supplemental DEIS, long-term impacts beyond the project lifetime of 50 years are either not anticipated or expected to be avoided through mitigation measures.

Table 5-1: Comparative Impacts of Alternatives

Resource	Alternative C		Alternative D		Alternative E		
Impact	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**No-action Alternative**
Land Use	Approximately 4,956.8 acres of right-of-way (ROW) would be required and would be restricted from some types of future development. ROW would include state and federal properties. ROW would include approximately 152.9 acres of Little Missouri National Grassland (LMNG), 57.9 acres of U.S. Army Corps of Engineer (USACE) property, approximately 202 acres of school trust land, and cross within approximately 200 feet of Bureau of Land Management (BLM) land. Approximately 73 acres would be permanently converted from agriculture use to utility use for the five new substations/ switchyards.	Loss of use for landowners within ROW on private lands during construction. Access restrictions and/or loss of use within ROW during construction on state or federal properties. Disturbance from heavy equipment may result in some crop loss during construction Substation/switchyard construction-related impacts such as increased noise and dust on surrounding agricultural lands.	Approximately 4,458.6 acres of ROW would be required and would be restricted from some types of future development. ROW would include state and federal properties. ROW would include approximately 57.0 acres of LMNG, 57.9 acres of USACE property, approximately 143.9 acres of school trust land, and cross within approximately 200 feet of BLM land. Approximately 85 acres would be permanently converted from agriculture use to utility use for the six new substations/ switchyards.	Same as Alternative C.	Approximately 5,597.3 acres of ROW would be required and would be restricted from some types of future development. ROW would include state and federal properties. ROW would include approximately 57.0 acres of LMNG, 57.9 acres of USACE property, approximately 209.9 acres of school trust land, and cross within approximately 200 feet of BLM land. Approximately 85 acres would be permanently converted from agriculture use to utility use for the six new substations/switchyards.	Same as Alternatives C and D.	No direct effect; indirect effect if future land uses were impeded by lack of increased electrical supply necessary to meet demands of development.
Socioeconomic Resources	Economic benefit to businesses and surrounding communities from increased electrical capacity and reliability. Potential changes in property values with six residences within 500 feet of the route. Property tax revenues of about $83,130 annually to study area counties.	Economic benefit to local communities during construction as a result of construction crews generating local revenue.	Economic benefit to businesses and surrounding communities from increased electrical capacity and reliability. Potential changes in property values with five residences within 500 feet of the route. Property tax revenues of about $74,900 annually to study area counties.	Economic benefit to local communities during construction as a result of construction crews generating local revenue.	Economic benefit to businesses and surrounding communities from increased electrical capacity and reliability. Potential changes in property values with six residences within 500 feet of the route. Property tax revenues of about $93,660 annually to study area counties.	Economic benefit to local communities during construction as a result of construction crews generating local revenue.	No direct effect; indirect effect if no improved electric reliability and capacity. This would harm local communities by limiting future development opportunities.
Environmental Justice	Land use restrictions within the ROW. Possible impact to property values for seven residences located in environmental justice blocks of 52 total residences within 0.25 mile. Visual presence and increase in fiscal receipts to counties.	Increase in noise and potential traffic disruptions during construction.	Land use restrictions within the ROW. Possible impact to property values for six residences located in environmental justice blocks of 44 total residences within 0.25 mile. Visual presence and increase in fiscal receipts to counties.	Increase in noise and potential traffic disruptions during construction.	Land use restrictions within the ROW. Possible impact to property values for six residences located in environmental justice blocks of 45 total residences within 0.25 mile. Visual presence and increase in fiscal receipts to counties.	Increase in noise and potential traffic disruptions during construction.	No effect.

Resource	Alternative C		Alternative D		Alternative E		
Impact	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**No-action Alternative**
Recreation and Tourism	Approximately 413.3 acres of state or federal land potentially open to dispersed recreational activities such as hunting would be located within the ROW. One U.S. Forest Service campground (Summit Campground) would be located within 0.5 mile of the ROW. Conversion of 73 acres of land for the five substations/switchyards would remove it from further land use, including recreational use.	Increased noise, dust, and traffic congestion in recreational areas. Temporary access restrictions during construction on public use areas. Increased noise, ground disturbance, access restrictions, and human activity may impede hunting activities around the substation/switchyard sites.	Approximately 258.8 acres of state or federal land potentially open to dispersed recreational activities such as hunting would be located within the ROW. Conversion of 85 acres of land for the six substations/switchyards would remove it from further land use, including recreational use.	Same as Alternative C.	Approximately 324.8 acres of state or federal land potentially open to dispersed recreational activities such as hunting would be located within the ROW. Conversion of 85 acres of land for the six substations/switchyards would remove it from further land use, including recreational use.	Same as Alternatives C and D.	No effect.
Utility Infrastructure and Transportation	No long-term effects on utility infrastructure are anticipated. No long-term effects on transportation are anticipated. An air space obstruction would result in the vicinity of the Sloulin Field International Airport in the city of Williston. Approvals would be necessary from the Federal Aviation Administration (FAA). No obstruction would result if the airport is relocated as proposed. Basin Electric would coordinate with BNSF Railway Company (BNSF) to minimize or avoid potential impacts on railroads in areas where the alternative route would traverse railroads at a vertical elevation.	Existing utility infrastructure would be traversed during construction activities and may be temporary taken out of service. Some temporary road closures are likely during construction activities and may result in short-term adverse impacts. Basin Electric would also coordinate with BNSF in order to string the transmission line over existing railroad tracks. Short-term interruption of existing transmission lines during substation/switchyard construction activities may result minor temporary impacts. The movement of heavy material haul trucks and road closures during substation/switchyard construction activities may result in short-term adverse impacts.	No long-term effects on utility infrastructure are anticipated. No long-term effects on transportation are anticipated. An air space obstruction would result in the vicinity of the Sloulin Field International Airport in the city of Williston. Approvals would be necessary from the FAA. No obstruction would result if the airport is relocated as proposed. Basin Electric would coordinate with BNSF to minimize or avoid potential impacts on railroads in areas where the alternative route would traverse railroads at a vertical elevation.	Existing utility infrastructure would be traversed during construction activities and may be temporary taken out of service. Some temporary road closures are likely during construction activities and may result in short-term adverse impacts. Basin Electric would also coordinate with BNSF in order to string the transmission line over existing railroad tracks. Short-term interruption of existing transmission lines during substation/switchyard construction activities may result minor temporary impacts. The movement of heavy material haul trucks and road closures during substation/switchyard construction activities may result in short-term adverse impacts.	No long-term effects on utility infrastructure are anticipated. No long-term effects on transportation are anticipated. Air space obstruction would result in the vicinity of the Sloulin Field International Airport in the city of Williston. Approvals would be necessary from the FAA. No obstruction would result if the airport is relocated as proposed. Basin Electric would coordinate with BNSF to minimize or avoid potential impacts on railroads in areas where the alternative route would traverse railroads at a vertical elevation.	Existing utility infrastructure would be traversed during construction activities and may be temporary taken out of service. Some temporary road closures are likely during construction activities and may result in short-term adverse impacts. Basin Electric would also coordinate with BNSF in order to string the transmission line over existing railroad tracks. Short-term interruption of existing transmission lines during substation/switchyard construction activities may result minor temporary impacts. The movement of heavy material haul trucks and road closures during substation/switchyard construction activities may result in short-term adverse impacts.	Significant utility system failures and damage if capacity is not increased and demand increases as projected. Electrical equipment used for oil and gas pipelines could be limited by reliability thereby causing more distribution via truck, causing road damage.
Geology and Landforms	Displacement of 2.4 million cubic feet of soil and rock during construction.	Potential for erosion on steeper slopes during construction.	Displacement of 2.2 million cubic feet of soil and rock during construction.	Potential for erosion on steeper slopes during construction.	Displacement of 2.7 million cubic feet of soil and rock during construction.	Potential for erosion on steeper slopes during construction.	No effect.

Resource	Alternative C		Alternative D		Alternative E		
Impact	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**No-action Alternative**
Soils and Farmland	Approximately 1.4 acres of soil surface (0.0009-acre per structure) would be permanently removed from production. Farmland for crop production permanently impacted only at structure locations. Any farmland within the five substation/switchyard sites (73 acres total) would be permanently converted to utility use.	Approximately 1,754 acres of temporary soil disturbance to prime farmland and farmland of statewide importance during construction within the ROW, with temporary loss of crop production.	Approximately 1.3 acres of soil surface (0.0009-acre per structure) would be permanently removed from production. Farmland for crop production permanently impacted only at structure locations. Any farmland within the six substation/switchyard sites (85 acres total) would be permanently converted to utility use.	Approximately 1,737 acres of temporary soil disturbance to prime farmland and farmland of statewide importance during construction within the ROW, with temporary loss of crop production.	Approximately 1.6 acres of soil surface (0.0009-acre per structure) would be permanently removed from production. Farmland for crop production permanently impacted only at structure locations. Any farmland within the six substation/switchyard sites (85 acres total) would be permanently converted to utility use.	Approximately 1,900 acres of temporary soil disturbance to prime farmland and farmland of statewide importance during construction within the ROW, with temporary loss of crop production.	No effect.
Water Resources	No effects anticipated. Approximately 14.3 acres of open water occur within the ROW; 19 perennial waterways and 16.5 acres of Federal Emergency Management Agency (FEMA) floodplain would be crossed, but all would be spanned.	Potential sedimentation and runoff caused by construction.	No effects anticipated. Approximately 12.7 acres of open water occur within the ROW; 17 perennial waterways and 16.5 acres of FEMA floodplain would be crossed, but all would be spanned.	Potential sedimentation and runoff caused by construction.	No effects anticipated. Approximately 14.5 acres of open water occur within the ROW; 20 perennial waterways and 16.5 acres of FEMA floodplain would be crossed, but all would be spanned.	Potential sedimentation and runoff caused by construction.	No effect.
Vegetation	Approximately 183 acres of woodland potentially removed within ROW, depending on slope. One acre of vegetation permanently removed within ROW at structure locations. Potential introduction of noxious weeds within ROW to be avoided by weed mitigation measures. Approximately 73 acres of vegetation removed from the five substation/switchyard sites and converted to utility use.	Disturbance of vegetation within the ROW and along construction access trails during construction. Natural Heritage Inventory sensitive ecological community potentially impacted.	Approximately 120 acres of woodland potentially removed within ROW, depending on slope. One acre of vegetation permanently removed within ROW at structure locations. Potential introduction of noxious weeds within ROW to be avoided by weed mitigation measures. Approximately 85 acres of vegetation removed from the six substation/switchyard sites and converted to utility use.	Disturbance of vegetation within the ROW and along construction access trails during construction. Natural Heritage Inventory sensitive ecological community potentially impacted.	Approximately 189 acres of woodland potentially removed within ROW, depending on slope. One acre of vegetation permanently removed within ROW at structure locations. Potential introduction of noxious weeds within ROW to be avoided by weed mitigation measures. Approximately 85 acres of vegetation removed from the six substation/switchyard sites and converted to utility use.	Disturbance of vegetation within the ROW and along construction access trails during construction. Natural Heritage Inventory sensitive ecological community potentially impacted.	No effect.
Wildlife	Loss of forested habitat as a result of the removal of up to 183 acres of woodland within the ROW. Some mortality of small, less-mobile species. Potential avian species collisions with power lines. Loss of 73 acres of habitat within the five substation/switchyard sites.	Disturbance within and near the ROW during construction due to human intrusion, noise, and construction activity. Temporary loss of habitat due to vegetation clearing within ROW during construction. Disturbance to nearby species due to construction activities at the five substation/switchyard sites.	Loss of forested habitat as a result of the removal of up to 120 acres of woodland within the ROW. Some mortality of small, less-mobile species. Potential avian species collisions with power lines. Loss of 85 acres of habitat within the six substation/switchyard sites.	Disturbance within and near the ROW during construction due to human intrusion, noise, and construction activity. Temporary loss of habitat due to vegetation clearing within ROW during construction. Disturbance to nearby species due to construction activities at the six substation/switchyard sites.	Loss of forested habitat as a result of the removal of up to 189 acres of woodland within the ROW. Some mortality of small, less-mobile species. Potential avian species collisions with power lines. Loss of 85 acres of habitat within the six substation/switchyard sites.	Disturbance within and near the ROW during construction due to human intrusion, noise, and construction activity. Temporary loss of habitat due to vegetation clearing within ROW during construction. Disturbance to nearby species due to construction activities at the six substation/switchyard sites.	No effect.
Aquatic Resources	Change in local aquatic habitats in areas where vegetation would be cleared along shoreline.	Potential for sedimentation, runoff, and spills during construction; to be avoided by use of BMPs.	Change in local aquatic habitats in areas where vegetation would be cleared along shoreline.	Potential for sedimentation, runoff, and spills during construction; to be avoided by use of BMPs.	Change in local aquatic habitats in areas where vegetation would be cleared along shoreline.	Potential for sedimentation, runoff, and spills during construction; to be avoided by use of BMPs.	No effect.

Resource	Alternative C		Alternative D		Alternative E		
Impact	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**No-action Alternative**
Special Status Species	No adverse effect on listed species pending outcome of consultation with USFWS and USFS.	Potential impacts on grassland habitat within ROW during construction	No adverse effect on listed species pending outcome of consultation with USFWS and USFS.	Potential impacts on grassland habitat within ROW during construction	No adverse effect on listed species pending outcome of consultation with USFWS and USFS.	Potential impacts on grassland habitat within ROW during construction	No effect.
Wetlands	No effect. All 33 acres of wetland within ROW would be spanned. No structures would be placed in wetlands and no wetland vegetation would be cleared.	Potential sedimentation and runoff caused by construction near wetlands.	No effect. All 31 acres of wetland within ROW would be spanned. No structures would be placed in wetlands and no wetland vegetation would be cleared.	Potential sedimentation and runoff caused by construction near wetlands.	No effect. All 40 acres of wetland within ROW would be spanned. No structures would be placed in wetlands and no wetland vegetation would be cleared.	Potential sedimentation and runoff caused by construction near wetlands.	No effect.
Aesthetics and Visual Resources	Change in the visual characteristics and viewshed within project area and for residents located near the transmission line (six residences within 500 feet). Additional visual element added to the landscape at the five substation/switchyard sites.	Visibility of construction vehicles and equipment along ROW.	Change in the visual characteristics and viewshed within project area and for residents located near the transmission line (five residences within 500 feet). Additional visual element added to the landscape at the six substation/switchyard sites.	Visibility of construction vehicles and equipment along ROW.	Change in the visual characteristics and viewshed within project area and for residents located near the transmission line (six residences within 500 feet). Additional visual element added to the landscape at the six substation/switchyard sites.	Visibility of construction vehicles and equipment along ROW.	No effect.
Cultural Resources	Currently evaluating whether project would have adverse effects on National Register of Historic Places (NRHP)-eligible cultural resources. 286 cultural resources have been identified within or immediately adjacent to the 1,000-foot preliminary area of potential effects (APE).	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources.	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources. 88 cultural resources have been identified within or immediately adjacent to the 1,000-foot preliminary APE.	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources.	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources. 88 cultural resources have been identified within or immediately adjacent to the 1,000-foot preliminary APE.	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources.	Currently evaluating whether project would have adverse effects on NRHP-eligible cultural resources.
Noise	No effect.	Increases in noise levels along the ROW from construction vehicles and equipment. Increases in noise levels for nearby residences during construction of the five substations/ switchyards.	No effect.	Increases in noise levels along the ROW from construction vehicles and equipment. Increases in noise levels for nearby residences during construction of the six substations/ switchyards.	No effect.	Increases in noise levels along the ROW from construction vehicles and equipment. Increases in noise levels for nearby residences during construction of the six substations/switchyards.	No effect.
Air Quality and Greenhouse Gas (GHG) Emissions	Potential increase in GHG levels as a result of the operation of the transmission line and substations/switchyards.	Increases in fugitive dust caused by construction activity, vehicles, and equipment. Increased emissions from construction vehicles and equipment.	Potential increase in GHG levels as a result of the operation of the transmission line and substations/switchyards.	Increases in fugitive dust caused by construction activity, vehicles, and equipment. Increased emissions from construction vehicles and equipment.	Potential increase in GHG levels as a result of the operation of the transmission line and substations/switchyards.	Increases in fugitive dust caused by construction activity, vehicles, and equipment. Increased emissions from construction vehicles and equipment.	No effect.

Resource	Alternative C		Alternative D		Alternative E		
Impact	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**No-action Alternative**
Public Health and Safety	Long-term adverse effects expected to be negligible to minor. Electric and magnetic fields (EMFs) would be well below identified thresholds to protect the public. The operation of farm equipment near proposed structures could result in unnecessary contact and/or damage to machinery and/or operators. Standard operating and safety procedures would be employed to ensure the safe delivery of services.	Hazardous and/or potentially hazardous materials may be encountered during construction, or exposure to energized transmission lines. These impacts are likely to be minor with the implementation of construction action plans that ensure worker safety, proper handling of hazardous materials, and spill cleanup.	Long-term adverse effects expected to be negligible to minor. EMFs would be well below identified thresholds to protect the public. The operation of farm equipment near proposed structures could result in unnecessary contact and/or damage to machinery and/or operators. Standard operating and safety procedures would be employed to ensure the safe delivery of services.	Hazardous and/or potentially hazardous materials may be encountered during construction, or exposure to energized transmission lines. These impacts are likely to be minor with the implementation of construction action plans that ensure worker safety, proper handling of hazardous materials, and spill cleanup.	Long-term adverse effects expected to be negligible to minor. EMFs would be well below identified thresholds to protect the public. The operation of farm equipment near proposed structures could result in unnecessary contact and/or damage to machinery and/or operators. Standard operating and safety procedures would be employed to ensure the safe delivery of services.	Hazardous and/or potentially hazardous materials may be encountered during construction, or exposure to energized transmission lines. These impacts are likely to be minor with the implementation of construction action plans that ensure worker safety, proper handling of hazardous materials, and spill cleanup.	No effect.

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6.0 REGULATORY AND PERMIT REQUIREMENTS

Table 6-1 describes potential project requirements that should be considered. This includes permits, approvals, and consultation, etc. required for the project. Basin Electric would obtain necessary permits from counties and/or municipalities along the route (such as permits for road, highway, and flood channel encroachment and crossings; and temporary use and occupancy permits). Basin Electric would also obtain any necessary pipeline and utility crossing permits for crossings of natural gas pipelines and electrical transmission lines.

Table 6-1: Potential Project Requirements

Requirement	Citation	Description
Potential Federal Requirements		
Archaeological Resources Protection Act	16 U.S.C. 470aa-470mm; Public Law 96-95 and amendments	This Act exists to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals.
Bald and Golden Eagle Protection Act	16 U.S.C 668-668d	The Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald or golden eagles, including their parts, nests, or eggs. A permitting program was established by the USFWS Division of Migratory Bird Management. If activities require the removal or relocation of an eagle nest, a permit is required from the Regional Bird Permitting office.
Clean Air Act	42 U.S.C. 7401	Under the Act, USEPA establishes National Ambient Air Quality Standards for certain pervasive pollutants. It establishes limitations on sulfur dioxide and NO_x emissions and sets permitting requirements. Authority for implementation of the permitting program is delegated to North Dakota Department of Health, Division of Air Quality.
Clean Water Act	32 U.S.C. 1251	The Act contains standards to address the causes of pollution and poor water quality, including municipal and industrial wastewater discharges, polluted runoff from urban and rural areas, and habitat destruction. USEPA has delegated authority to the North Dakota Department of Health, Division of Water Quality.
		Section 401 – Water Quality Certification for Wetlands. Requires certification for any permit or license issued by a federal agency for any activity that may result in a discharge into waters of the state to ensure that the proposed project will not violate state water standards. Permits are issued by the North Dakota Department of Health, Division of Water Quality.
		Section 404 – Permits for Dredged or Fill Material. Regulates the discharge of dredged or fill material in the jurisdictional wetlands and waters of the United States. Permits are issued by USACE, with cooperation from USFWS and USEPA.

Requirement	Citation	Description
Determination of No Hazard to Air Navigation	14 C.F.R. Part 77	Requires that the FAA issue a determination stating whether the proposed construction or alteration would be a hazard to air navigation, and will advise all known interested persons.
Easements for Rights-of-Way	10 U.S.C. 2668	Easement will be required to cross lands owned and managed by USACE located near the Missouri River.
Endangered Species Act	16 U.S.C. 1531 et seq.	Section 7 of the Act requires any federal agency authorizing, funding, or carrying out any action to ensure that the action is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species. If the project is determined to be an activity that might incidentally harm (or “take”) endangered or threatened species, the applicant would be required to obtain an incidental take permit from the USFWS. In addition to obtaining the permit, the applicant would be required to develop a Habitat Conservation Plan.
Farmland Protection Policy Act	7 U.S.C. 4201 et seq.	The Act requires federal agencies to identify and quantify adverse impacts of federal programs on farmlands to minimize the number of federal programs that contribute to the unnecessary and irreversible conversion of agricultural land to non-agricultural uses. The Act designates farmland as prime, unique, of statewide importance, and of local importance. The Act is overseen by NRCS.
Federal Highway Administration Encroachment Permits		The Department of Transportation’s Federal Highway Administration requires encroachment permits for crossing federally funded highways.
Federal Land Policy Management Act	7 U.S.C. 2801 et seq.	Requires that each federal land-managing agency have a program in place for controlling undesirable plant species and must implement cooperative agreements with the State. Requires that any environmental assessments or impact statements that may be required to implement plant control agreements must be completed within one year of the time the need for the document was established.
Federal Power Act	16 U.S.C. Chapter 12	Requires federal agencies to provide transmission service on a non-discriminatory basis through compliance with established tariffs.
Fish and Wildlife Conservation Act	16 U.S.C. 2901 et seq.	The Act encourages federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats. Mitigation methods should be designed to conserve wildlife and their habitats.
Fish and Wildlife Coordination Act	16 U.S.C. 661 et seq.	The Act requires federal agencies to consult with USFWS and the state agency responsible (NDGFD) for fish and wildlife resources if the project affects water resources.
Migratory Bird Treaty Act	16 U.S.C. 703 et seq.	The Act protects birds that have common migration patterns between the United States and Canada. Under the Act, taking, killing or possessing migratory birds or their eggs or nests is unlawful. The Act requires a Special Purpose Permit when an applicant demonstrates a legitimate purpose to violate the Act.

Requirement	Citation	Description
National Environmental Policy Act	42 U.S.C. 4321-4347	The Act requires agencies of the federal government to study the possible environmental impacts of major federal actions significantly affecting the quality of the human environment.
National Forest Management Act	16 U.S.C. 1600-1614	The Act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of national forests.
National Historic Preservation Act	16 U.S.C. 470 et seq.	Section 106 of the Act requires the federal agency to take into account the effects of its undertakings on properties listed in or eligible for listing in the NRHP, including prehistoric or historic sites, and districts, buildings, structures, objects, or properties of traditional religious or cultural importance. The NHPA also requires the federal agency to afford the Advisory Council on Historic Preservation an opportunity to comment on the undertaking. The State Historical Society of North Dakota must also provide consultation.
National Trails System Act	16 U.S.C. 1241-1251	The Act and its subsequent amendments authorized a nationwide system of scenic, historic, and recreation trails. National historic trails shall have as their purpose the identification and protection of the historic route and its historic remnants and artifacts for public use and enjoyment.
Noise Control Act	42 U.S.C. 4901-4918	The Act directs federal agencies to carry out programs in their jurisdictions "to the fullest extent within their authority" and in a manner that furthers a national policy of promoting an environment free from noise that jeopardizes health and welfare.
Occupational Safety and Health Act	29 U.S.C. 651 et seq.	The Act established regulations for the protection of worker health and safety. The applicant would be subject to Occupational Health and Safety Administration general industry standards and construction standards.
Pollution Prevention Act	42 U.S.C. 13101 et seq.	The Act establishes a national policy for waste management and pollution control.
Rural Utilities Service Environmental Policies and Procedures	7 C.F.R. Part 1794	RUS must make decisions that are based on an understanding of environmental consequences, and take actions that protect, restore, and enhance the environment. In assessing the potential environmental impacts of its actions, RUS will consult early with appropriate federal, state, and local agencies and other organizations to provide decision-makers with information on the issues that are significant to the action in question. The applicant is responsible for ensuring that proposed actions are in compliance with all appropriate RUS requirements. Environmental documents submitted by the applicant shall be prepared under the oversight and guidance of RUS. RUS will evaluate and be responsible for the accuracy of all information contained therein.

Requirement	Citation	Description
River and Harbors Act	33 U.S.C. 403	Section 10 of the Act prohibits the unauthorized obstruction or alteration of any navigable water of the United States. This section provides that the construction of any structure in or over any navigable water of the United States, or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army, which has been delegated to the Chief of Engineers. A SUP is required to cross lands owned and managed by USACE located near the Missouri River.
Potential Executive Orders		
Executive Order 11593 Enhancement, Protection, and Management of the Cultural Environment		This executive order directs state and local historic preservation officials to inventory historic and prehistoric sites and to act as steward to nation's heritage resources.
Executive Order 11988 Floodplain Management		The executive order directs federal agencies to establish procedures to ensure that they consider potential effects of flood hazards and floodplain management for any action undertaken. Agencies are to avoid impacts to floodplains to the extent practical.
Executive Order 11990 Protection of Wetlands		The executive order directs federal agencies to avoid short- and long-term impacts to wetlands if a practical alternative exists.
Executive Order 12898 Environmental Justice		The executive order directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.
Executive Order 13007 Indian Sacred Sites		The executive order directs federal agencies, to the extent permitted by law and consistent with agency missions, to avoid adverse effects to sacred sites and to provide access to those sites to Native Americans for religious practices.
Executive Order 13112 Invasive Species		The executive order directs federal agencies to prevent the introduction or to monitor and control invasive non-native species and provide for restoration of native species.
Executive Order 13175 Consultation and Coordination with Indian Tribal Governments		The executive order directs federal agencies to establish meaningful consultation and collaboration with tribal governments to strengthen United States government to government relationships with Native American tribes.
Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds		The executive order directs federal agencies to avoid or minimize the negative impacts of their actions on migratory birds, and to take active steps to protect birds and their habitats.
Potential State Requirements		
Little Missouri Scenic River Act	ND Century Code 61-29	The Act aims to preserve the Little Missouri River as nearly as possible in its present state.
North Dakota Indian Burial Laws	ND Century Code 55-03 and 23-06-27	If prehistoric and historic human burials, human remains and burial goods are inadvertently discovered on state, local and private lands, all activities must cease until the State Historical Society of North Dakota completes an initial examination of the site.

Requirement	Citation	Description
North Dakota Department of Health Requirements	ND Century Code 61-28	In accordance with the North Dakota Water Pollution Control Act, the applicant must obtain authorization under the North Dakota Pollutant Discharge Elimination Systems from the North Dakota Department of Health, Division of Water Quality. This authorization requires the applicant to have a stormwater pollution prevention plan.
State Road Crossing Permits		The applicant must obtain permits from the North Dakota Department of Transportation.
State Highway Access Permits		The applicant must obtain permits from the North Dakota Department of Transportation.
State Utility Occupancy Permits		The applicant must obtain permits from the North Dakota Department of Transportation.
Permits to Cross State Wildlife Management Areas		The applicant must obtain permits from NDGFD.
Consultation/Approval regarding State-Listed Species of Concern		The applicant must obtain permits from NDGFD.
Consultation regarding Noxious Weeds		The applicant must obtain permits from NDGFD.
Consultation regarding Killdeer Mountain Four Bears Scenic Byway		The applicant must obtain permits from the North Dakota Parks and Recreation Department.
North Dakota Energy Conversion and Transmission Facility Siting Act		The applicant must obtain certificate of Corridor Compatibility and a Route Permit from NDPSC.
Permits for Crossing Trust Lands		The applicant must obtain permits from the North Dakota State Land Department.
Construction Permits		The applicant must obtain construction permits for crossing navigable waterways from the North Dakota State Water Commission.
Potential Departmental Requirements		
Viewshed Impact Consultation		NPS should provide the applicant with consultation regarding potential viewshed impacts to TRNP.
Conservation Reserve Program Consultation		The applicant must consult with the USDA Farm Services Agency, North Dakota Office regarding crossing lands enrolled in the Conservation Reserve Program.
Farmland Conversion Impact Rating		The applicant must obtain a Farmland Conversion Impact Rating from the NRCS.

Requirement	Citation	Description
Potential Tribe Requirements		
Tribal Consultations		The following tribes may seek consultation on the project: Flandreau Santee Sioux, Santee Sioux Nation, Fort Peck Assiniboine & Sioux Tribes, Spirit Lake Tribe, Fort Belknap Indian Community, Standing Rock Sioux, Leech Lake Band of Ojibwe, Three Affiliated Tribes, Lower Sioux Indian Community, Turtle Mountain Chippewa, Minnesota Chippewa Tribe, Upper Sioux Indian Community, Prairie Island Indian Community, and White Earth Nation.
Other Potential Requirements		
Permits for County Road Encroachment		The applicant must obtain County Permits from Dunn, McKenzie, Mercer, Mountrail, and Williams counties.
County Conditional Use Permits		The applicant must obtain County Permits from Dunn, McKenzie, Mercer, Mountrail, and Williams counties.
Permits for County Floodplain Encroachment		The applicant must obtain County Permits from Dunn, McKenzie, Mercer, Mountrail, and Williams counties.
Authorization for Crossing Railroads		The applicant must obtain a permit from BNSF to cross railroads.

7.0 AGENCIES AND TRIBES CONTACTED

Consultation with tribes, federal, and state agencies has been ongoing. Various federal and state interagency meetings were conducted to share project information and determine the scope of the EIS and throughout the development of the EIS.

7.1 COOPERATING AGENCIES

U.S. Department of Agriculture, Rural Utilities Service (lead agency) was assisted by the U.S. Department of Agriculture, Forest Service and the U.S. Department of Energy, Western Area Power Administration as cooperating agencies in preparing this EIS.

7.2 FEDERAL AGENCIES CONTACTED

- Federal Aviation Administration
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture, Natural Resources Conservation Service
- U.S. Department of the Interior, Fish and Wildlife Service
- U.S. Department of the Interior, National Park Service
- U.S. Environmental Protection Agency

7.3 NORTH DAKOTA AGENCIES CONTACTED

- North Dakota Department of Health
- North Dakota State Department of Trust Lands
- North Dakota Transmission Authority
- State Historical Society of North Dakota

7.4 TRIBES CONTACTED

- Flandreau Santee Sioux
- Fort Belknap Indian Community
- Fort Peck Assiniboine and Sioux Tribes
- Leech Lake Band of Ojibwe
- Lower Sioux Indian Community
- Minnesota Chippewa Tribe
- Prairie Island Indian Community
- Santee Sioux Nation

- Sisseton Wahpeton Oyate
- Spirit Lake Tribe
- Standing Rock Sioux
- Three Affiliated Tribes
- Turtle Mountain Chippewa
- Upper Sioux Indian Community
- White Earth Nation

8.0 DISTRIBUTION LIST

8.1 FEDERAL AGENCIES

- Advisory Council on Historic Preservation
- Federal Aviation Administration
- Federal Emergency Management Agency
- Federal Energy Regulatory Commission
- Federal Highway Administration
- National Agricultural Library
- National Park Service, Theodore Roosevelt National Park
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture, Natural Resource Conservation Service
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service
- U.S. Department of Energy
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Department of the Interior, Bureau of Indian Affairs
- U.S. Department of the Interior, Bureau of Land Management
- U.S. Department of the Interior, Office of Environmental Policy and Compliance
- U.S. Geological Survey

8.2 TRIBAL GOVERNMENTS AND AGENCIES

- Crow Tribal Council
- Fort Peck Tribes
- Oglala Sioux Tribal Council
- Northern Arapaho Tribe
- Northern Cheyenne Tribal Council
- Rosebud Sioux Tribe of Indians
- Shoshone Business Council
- Standing Rock Sioux Tribe
- Three Affiliated Tribes

8.3 NORTH DAKOTA STATE AGENCIES

- North Dakota Department of Agriculture
- North Dakota Department of Commerce
- North Dakota Department of Health
- North Dakota Department of Transportation
- North Dakota Farm Bureau
- North Dakota Forest Service
- North Dakota Game and Fish Department
- North Dakota Geological Survey
- North Dakota Indian Affairs Commission
- North Dakota Industrial Commission
- North Dakota Parks and Recreation Department
- North Dakota Public Service Commission
- North Dakota Heritage Center
- North Dakota State Land Department
- North Dakota State Legislature
- North Dakota Transmission Authority
- North Dakota Water Commission
- State Historical Society of North Dakota

8.4 LOCAL UNITS OF GOVERNMENT

- City of Beulah
- City of Kildeer
- City of Ray
- City of Watford City
- Dunn County
- McKenzie County
- Mercer County
- Mountrail County
- Town of Alexander

- Town of Arnegard
- Town of Dodge
- Town of Dunn Center
- Town of Epping
- Town of Golden Valley
- Town of Halliday
- Town of Rawson
- Town of Springbrook
- Town of Zap
- Williams County
- Williston City Commission

8.5 LOCAL LIBRARIES

- Beulah Public Library
- Bismarck Public Library
- Killdeer School & Public Library
- McKenzie County Library
- Stanley Public Library
- Williston Community Library

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10.0 LIST OF PREPARERS

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Name	Agency/Firm	Title	Education	Years of Experience	Responsibility
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Appendix A

Standard Mitigation Measures to be Used by Basin Electric for the Proposed AVS to Neset Transmission Project

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Appendix A - Standard Mitigation Measures to be Used by Basin Electric for the Proposed AVS 345-kV Transmission Project

General	
Gen-1	The requirements of all applicable Federal, State, and local environmental laws, executive orders, and regulations would be met during construction and operation of the proposed project.
Gen-2	All permit conditions required by Federal, State, and local agencies would be adhered to for construction and operation of the proposed project.
Gen-3	Prior to construction, all construction personnel and heavy equipment operators would be instructed on the protection of cultural, paleontological, and ecological resources, and all applicable permit requirements. Construction contracts would address: • Federal, State, and local laws regarding antiquities, fossils, plants, and wildlife, including collection/removal • The importance and necessity of protecting such resources • All applicable permit requirements
Air Quality	
Air-1	The emission of dust into the atmosphere during construction would be minimized to the extent practical during the manufacture, handling, and storage of concrete aggregate. Methods and equipment would be used as necessary to collect, dispose, or prevent dust during these operations. The methods of storing and handling cement and additives would also include means of minimizing atmospheric discharges of dust.
Air-2	All construction equipment and vehicles will be maintained in efficient operating condition and comply with applicable state and federal emission standards. Engine idling time will be limited and equipment will be shut down when not in use. Vehicles and equipment that show excessive emissions or other inefficient conditions would not be operated until repairs or adjustments are made.
Air-3	All waste materials shall be disposed of at permitted waste disposal areas or landfills. Burning or burying waste materials on the right-of-way (ROW) would not be permitted. Tree and grubbing residue may be buried on site or in the ROW with landowner approval.
Air-4	Nuisance to persons, dwellings, or crops resulting from dust originating from construction would be minimized. Oil and other petroleum derivatives would not be used for dust control. Speed limits on local gravel roads would be enforced to reduce dust.

Water Resources	
Water-1	Construction activities would comply with the requirements of North Dakota permits for stormwater discharges for construction activities, which specify appropriate best management practices, erosion and sediment control measures, and disposal practices. Best management practices (BMPs) will be included in a Stormwater Pollution Prevention Plan. Construction activities adjacent to or encroaching on streams or waterways, including work within rights-of-way, construction of access roads on hillsides, and dewatering work for structure foundations, or earthwork operations would be conducted to prevent disturbed soils, muddy water, and eroded materials from entering streams or waterways by construction of intercepting ditches, bypass channels, barriers, settling ponds, or by other approved means.
Water-2	Construction activities would be conducted to prevent the accidental spillage of solid matter contaminants, debris, hazardous liquids, or other pollutants into streams, waterways, lakes, land, and underground aquifers. Such pollutants and waste include, but are not restricted to, refuse, garbage, cement, concrete, sanitary waste, industrial waste, oil, and other petroleum products, aggregate processing tailing, mineral salts, and thermal pollution. A hazardous materials management and spill prevention plan would be developed for construction that addresses storage, use, transportation, and disposal of hazardous materials, and an emergency response plan would be in place in the event of an accidental spill.
Water-3	Excavated material or construction materials would not be stockpiled or deposited near or on stream banks, lake shorelines, or other waterway perimeters unless protected from high water or storm runoff or encroachment upon the actual waterway itself.
Water-4	Wastewater discharge from any construction operations would not enter streams, waterways, or other surface waters without the appropriate permit(s).
Water-5	Equipment washing, storage of petroleum products, lubricants, solvents and hazardous materials, structure sites, and other disturbed areas would be located at least 100 feet, where practical, from rivers, streams (including ephemeral streams), ponds, lakes, and reservoirs. This includes construction vehicles and heavy equipment when parked overnight or longer.
Water-6	ROW access roads would be located at least 100 feet, where practical, from rivers, ponds, lakes, and reservoirs.

Water-7	All stream crossings considered jurisdictional by the U.S. Army Corps of Engineers (USACE) would be crossed by permit only. Where required, culverts of adequate size to accommodate the estimated peak flow of the stream would be installed. Disturbance of the stream banks and beds during construction would be minimized. Disturbed areas would be regarded and revegetated in accordance with mitigation measures listed for soil/vegetation resources.
Water-8	If the banks of ephemeral stream crossings are sufficiently high and steep that breaking them down for a crossing would cause excessive disturbance, culverts would be installed using the same measures as for culverts on perennial streams.
Water-9	Heavy equipment movement near streams and other surface waters would be minimized, to the extent practical.
Water-10	Narrow flood-prone areas would be spanned.
Geology and Minerals, Paleontology, and Soils	
Geo-1	Removed topsoil would be used for landscaping and as engineered fill, as appropriate, or stockpiled and re-spread subsequent to construction.
Geo-2	During construction, if any paleontological resources are discovered, work would cease within a 50-foot radius of the discovery. Any artifacts or fossils discovered would not be disturbed and Western would be notified of the discovery immediately.
Geo-3	Access roads would generally follow the contour of the land to the greatest extent practical rather than a straight line along the ROW where steep features would result in a higher erosion potential.
Geo-4	To the extent practical, excavated areas would be re-contoured so that large volumes of water would not collect and stand therein. Before being abandoned, the sides of excavations would be brought to stable slopes, giving a natural appearance, and revegetated. Waste soil piles would be shaped to provide a natural appearance.
Biological Resources	
Bio-1	Prior to construction, potentially-impacted wetland areas would be identified and marked. Wetland and riparian areas would be avoided to the extent practical by spanning of the wetlands and the placement of structures outside of wetland areas. If wetland or riparian areas are unavoidable, impacts would be minimized or mitigated. Jurisdictional waters that are impacted as a result of implementing the proposed project would be mitigated in accordance with USACE requirements.

Bio-2	Care would be used in preserving the natural landscape and vegetation. Construction operations would be conducted to prevent, to the extent practical, any unnecessary destruction, scarring, or defacing of the natural surroundings, vegetation, trees, and native shrubbery in the vicinity of the work. Vegetation would be replaced at landowner's request, providing mitigation complying with North American Electric Reliability Council (NERC) requirements.
Bio-3	A vegetation management plan will be developed to address the potential spread of noxious weeds during construction activities. This plan will contain strategies for prevention, detection, and control of noxious weeds. Example measures will include the washing of construction vehicles prior to use at construction work sites and revegetation with a native seed mix.
Bio-4	Upon completion of work, all non-agricultural disturbed areas and construction staging areas not needed for maintenance access would be re-graded so that all surfaces drain naturally, blend with the natural terrain, and are reseeded to blend with native vegetation with a seed mixture certified as free of noxious or invasive weeds. All destruction, scarring, damage, or defacing of the landscape resulting from construction would be repaired.
Bio-5	Construction staging areas would be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent. Unless otherwise agreed upon by the landowner, all storage and construction materials and debris would be removed from the construction staging areas once construction is complete, and the areas returned to original use or re-graded and seeded as for nonagricultural disturbed areas.
Bio-6	Native shrubs that would not interfere with access or the safe operation of the transmission line would be allowed to reestablish in the ROW. Areas with native shrubs that would be disturbed would be replanted with regionally-native species following the disturbance.
Bio-7	Trees and shrubs anticipated to be cleared, including those that are considered invasive species or noxious weeds shall be inventoried before cutting. The inventory shall record the location, number, and species of trees and shrubs. In windbreaks, shelterbelts, and other planted areas, trees or shrubs anticipated to be cleared, regardless of size, shall be inventoried for replacement. In native growth areas, trees anticipated to be cleared that are 1-inch diameter at breast height (dbh) or greater shall be inventoried for replacement, as well as all shrubs in the permanent ROW.

Bio-8	In native growth areas outside the permanent ROW, shrubs shall be cut flush with the surface of the ground, taking care to leave the naturally occurring seed bank and root stock intact. If soil disturbance is necessary, the native topsoil shall be preserved and replaced after construction is completed. Shrubs shall be allowed to regenerate naturally where native topsoil is preserved and replaced. Where native topsoil is not preserved and replaced, shrubs anticipated to be cleared shall be inventoried for replacement.
Bio-9	In native growth areas, trees and shrubs may be inventoried by actual count or by a sampling method that will properly represent the woody vegetation population. A sampling plan developed by the company, filed with the North Dakota Public Service Commission (NDPSC), and approved prior to the start of construction shall define the sampling method to be used for trees, for tall shrubs and for low shrubs. The data from the sample plots shall be extrapolated to the total acreage of the wooded area to be cleared to determine the species and quantity of trees and shrubs to be replaced.
Bio-10	Trees and shrubs shall be selectively cleared, leaving mature trees and shrubs intact where practical. The width of clear cuts through windbreaks, shelterbelts and all other wooded areas shall be limited to 50 feet or less unless otherwise approved by the NDPSC. If the area of trees or shrubs actually cleared differs from the area inventoried, the difference in number of trees and shrubs to be replaced shall be noted on the inventory.
Bio-11	Prior to replacement, documentation identifying the number and variety of trees removed as well as the mitigation plan for the proposed number, variety, type, location and date of replacement plantings shall be filed with the NDPSC for approval. Tree replacement shall be on a 2 to 1 basis with 2-year-old saplings. Shrub replacement shall be on a 2 to 1 basis with stem cuttings. Trees and shrubs shall be replaced by the same species or similar species, except in the case of invasive species or noxious weeds, suitable for North Dakota growing conditions as recommended by the North Dakota Forest Service.
Bio-12	Landowners shall be given the option of having replacement trees or shrubs planted off the ROW on the landowner's property or waiving that requirement in writing and allowing those replacement trees or shrubs to be planted at alternative locations.
Bio-13	At the conclusion of the project, documentation identifying the actual number, variety, type, location, and date of the replacement plantings shall be filed with the NDPSC. Tree and shrub replacements shall be inspected once a year for three years, on or about the anniversary of the plantings, and, on or shortly before October 1 of each year, a report shall be submitted to the Commission documenting the condition of replacement planting and any woodlands work completed. If after three years from the anniversary of the plantings the survival rate is less than 75 percent, the NDPSC may order additional planting(s).

Bio-14	An Avian Protection Plan would be developed to minimize impacts on nesting birds, as well as to minimize the electrocution and collision of migratory and resident bird species. The Avian Protection Plan would include provisions for adequate distance between conductors and distances between conductors and grounded surfaces to minimize electrocution risk. The plan would identify timeframes for construction and routine maintenance to avoid the nesting period of breeding birds. It would also include methods for minimizing bird collisions during line routing as well as methods for minimizing collisions following construction. The Avian Protection Plan would follow guidelines described at www.aplic.org. It would be provided to USFWS and the state wildlife agency for comment. A final copy of the plan would be provided to the applicable USFWS and state wildlife agency offices for their reference.
Bio-15	Holes drilled or excavated for pole placement or foundation construction and left unattended overnight would be marked and secured with temporary fencing to reduce the potential for livestock and wildlife to enter the holes, and for public safety.
Land Use	
Land-1	The minimum area necessary would be used for access roads during project construction.
Land-2	When practical, transmission structures would be located and designed to conform to the terrain. Leveling and benching of the structure sites would be the minimum necessary to allow structure assembly and erection.
Land-3	Transmission structures would be located, where practical, to span sensitive land uses. Where practical, construction access roads would be located to avoid sensitive conditions.
Land-4	The precise location of all structure sites, ROW, and other disturbed areas would be determined with landowners' or land management agencies' input.
Land-5	The movement of crews and equipment would be limited to the ROW and areas surveyed for cultural, historical, and biological resources, including access routes. To the extent practicable, the contractor would limit movement on the ROW to minimize damage to grazing land, crops, or property and would avoid marring the land.
Land-6	Where practical, construction activities would be scheduled during periods when agricultural activities would be minimally affected or the landowner would be compensated accordingly.
Land-7	Fences, gates, and similar improvements that are removed or damaged would be promptly repaired or replaced.

Land-8	Transmission structure design and placement would be selected to reduce potential conflicts with agricultural practices and to reduce the amount of land required for transmission lines.
Land-9	ROW would be purchased through negotiations with each landowner affected by the proposed project. Payment would be made of full value for crop damages or other property damage during construction or maintenance.
Land-10	When weather and ground conditions permit, all deep ruts that are hazardous to farming operations and equipment movement would be eliminated or compensation would be provided as an alternative if the landowner desires. Such ruts would be leveled, filled, and graded, or otherwise eliminated in an approved manner. Ruts, scars, and compacted soils from construction activities in productive hay or crop lands would be loosened and leveled by scarifying, harrowing, disking, or other appropriate methods. Damage to ditches, tile drains, terraces, roads, and other land features would be corrected. Land contours and facilities would be restored as nearly as practical to their original conditions.
Public Health and Safety	
PH-1	When appropriate, pilot vehicles would accompany the movement of heavy equipment. Traffic control barriers and warning devices would be used when appropriate.
PH-2	All necessary provisions would be made to conform to safety requirements for maintaining the flow of public traffic and avoiding congestion at critical locations. Construction operations would be conducted to offer the least possible obstruction and inconvenience to public traffic, such as by the use of pilot cars to accompany trucks with oversized loads and slow-moving vehicles, scheduling heavy equipment transport to avoid high traffic periods, and where feasible, use of existing rail facilities. Construction workers will be encouraged to carpool to the construction site.
PH-3	Design would include reasonable mitigation measures to reduce problems of induced currents into conductive objects within the ROW. Problems of induced currents during construction and operation would be resolved, to the mutual satisfaction of the parties involved.
PH-4	Complaints of radio or television interference generated by the transmission line would be investigated and appropriate mitigation measures would be implemented.
PH-5	Audible noise and electric and magnetic fields during construction and operation of the proposed project would be addressed as necessary on a case-by-case basis.

PH-6	Transmission line materials would be designed to minimize corona. Tension would be maintained on all insulator assemblies to assure positive contact between insulators, thereby avoiding sparking. Caution would be exercised during construction to avoid nicking the conductor surface, which may provide points for corona to occur.
PH-7	The construction contractor would establish a health and safety program that incorporates Occupational Safety and Health Administration (OSHA) standards such as requirements for hearing protection, personal protective equipment, site access, chemical exposure limits, safe work practices, training program, and emergency procedures. The program would be reviewed with fire department personnel and emergency services personnel to reduce risk of construction and operation activities interfering with emergency response or evacuation plans and procedures.
PH-8	At the end of every work day, contractors would secure all construction areas to protect equipment and materials and discourage public access. Fueling of vehicles would be conducted in compliance with established procedures designed to minimize fire risks and fuel spills.
Visual Resources	
Vis-1	Structure types (designs) would be uniform, to the extent practical.
Vis-2	Transmission line materials would be designed to minimize corona. To reduce potential visual impacts at highway and trail crossings, structures would be placed at the maximum feasible distance from the crossing, within limits of structure design.
Vis-3	Minimum set-back requirements from residences would further mitigate visual impacts.
Noise	
Noise-1	An adequate buffer would be maintained around the proposed substation sites to minimize construction and operational noise impacts on area residents.
Noise-2	Power lines would be designed to minimize noise and other effects from energized conductors.
Noise-3	To avoid nuisance noise conditions, transmission line construction would be limited to daytime hours whenever practical.
Noise-4	To avoid nuisance conditions due to construction noise, all internal combustion engines used in connection with construction activity would be fitted with an approved muffler and spark arrester.

Additional BMPs identified since the publication of the DEIS include the following:

Biological Resources	
	Prohibit construction in designated critical habitat for piping plover during the nesting season (mid-April to mid-August).
	Conduct a presence survey for piping plover prior to initiating construction activities in areas identified as habitat for the species, if construction occurs during nesting season (April 1 through August 31).
	Conduct an occupancy survey for Sprague's pipit prior to construction activities in areas identified as habitat for the species if construction is proposed to occur between April 15 and August 1.
	Basin Electric has committed to coordinate with the U.S. Forest Service and North Dakota Game and Fish Department to avoid construction during bighorn sheep lambing season (April 1 through July 1) in the Little Missouri Badlands area and Little Missouri National Grasslands.
	Structures will generally not be placed within 0.25 mile of active lek sites. In addition, Basin Electric will consult with the agencies prior to construction within a 1-mile radius of an active lek during the period of March 1 through June 15. If construction will occur within 1 mile of any historic lek during this time period, surveys will be done prior to construction to determine use of the lek.
	To decrease direct impacts on the species during construction, proposed construction activities within 1,000 feet of suitable hibernacula will be avoided during the winter hibernation period (roughly late fall to early spring). In addition to avoiding hibernacula during construction, all mature, dead, or dying trees would be left intact, where they do not pose a safety concern for line reliability.
Land Use	
	Restrict cattle from grazing within the ROW after construction is completed until grass is re-established within the ROW.
Transportation and Infrastructure	
	Follow the American Railway Engineering and Maintenance-of-Way Association specifications for steady and rail-to-ground and equipment-to-ground voltage levels to avoid electrical interference from capacitive, electric and magnetic, and conductive effects.

Visual Resources	
	To minimize visual contrast at the Little Missouri River crossing, structures placed at this river crossing location will be constructed of weathering steel to present a reduced visual contrast to the surrounding landscape compared to galvanized steel construction.

Appendix B

Modeled Corona Outputs

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     ***********************************************
     *       C O R O N A   A N D   F I E L D       *
     *        E F F E C T S   P R O G R A M        *
     *   Source: Bonneville Power Administration   *
     ***********************************************

   +++++++++++++++++++
   + INPUT DATA LIST +

  +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  10/ 6/2011          5:46:35 pm
+********  Basin 345/115kV EMF Calcs  ****************************
+****  Double-Circuit Vertical -- (1)2306.2kcmil, (1)795kcmil ACSR ****
+      1       0       6       8   362.0    2.00    1.00     .00

(ENGLISH UNITS OPTION)

   LINE GRADIENTS COMPUTED BY PROGRAM

PHYSICAL SYSTEM CONSISTS OF   8 CONDUCTORS, OF WHICH   6 ARE ENERGIZED PHASES

+COMB  MF  XX  XX  XX  XX  XX  XX
+   4.921   6.562   9.842    .000   1.000  75.000   3.280   4.000   3.280
+115-A       A   -15.00   90.00    1   1.063     .00   69.70      .0     .88     .00
+115-B       A   -17.00   65.00    1   1.063     .00   69.70  -120.0     .88     .00
+115-C       A   -15.00   40.00    1   1.063     .00   69.70   120.0     .88     .00
+345-A       A    15.00   80.00    1   1.802     .00  209.00      .0    1.65     .00
+345-B       A    17.00   55.00    1   1.802     .00  209.00  -120.0    1.65     .00
+345-C       A    15.00   30.00    1   1.802     .00  209.00   120.0    1.65     .00
+GND-1       A    -8.00  110.00    1    .500     .00     .00      .0     .00     .00
+GND-2       A     8.00  110.00    1    .500     .00     .00      .0     .00     .00
+      81  -200.0     5.0
+       0      .0      .0
```

COMBINED OUTPUT OF AUDIBLE NOISE, RADIO NOISE, TVI, OZONE CONCENTRATION, GROUND GRADIENT AND MAGNETIC FIELD

******** Basin 345/115kV EMF Calcs ****************************
**** Double-Circuit Vertical -- (1)2306.2kcmil, (1)795kcmil ACSR ****

362.0 KV

	DIST. FROM CENTER OF TOWER (FEET)	HEIGHT (FEET)	MAXIMUM GRADIENT (KV/CM)	SUBCON DIAM. (IN)	NO. OF SUBCON	SUBCON SPACING (IN)	VOLTAGE L-N (KV)	PHASE ANGLE (DEGREES)	CURRENT (KAMPS)	CORONA LOSSES (KW/MI)
115-A	-15.00	90.00	6.39	1.06	1.00	.00	69.70	.00	.875	.009
115-B	-17.00	65.00	7.93	1.06	1.00	.00	69.70	-120.00	.875	.038
115-C	-15.00	40.00	7.55	1.06	1.00	.00	69.70	120.00	.875	.028
345-A	15.00	80.00	14.96	1.80	1.00	.00	209.00	.00	1.650	19.347
345-B	17.00	55.00	15.88	1.80	1.00	.00	209.00	-120.00	1.650	28.506
345-C	15.00	30.00	15.44	1.80	1.00	.00	209.00	120.00	1.650	23.775
GND-1	-8.00	110.00	4.80	.50	1.00	.00	.00	.00	.000	.000
GND-2	8.00	110.00	5.50	.50	1.00	.00	.00	.00	.000	.000

AN MICROPHONE HT.= 4.9 FT, RI ANT. HT.= 6.6 FT, TV ANT. HT.= 9.8 FT, ALTITUDE= .0 FT
RI FREQ= 1.000 MHZ, TV FREQ= 75.000 MHZ, WIND VEL.(OZ) = 2.000 MPH, GROUND CONDUCTIVITY = 4.0 MMHOS /M
E-FIELD TRANSDUCER HT.= 3.3FT, B-FIELD TRANSDUCER HT. = 3.3FT

LATERAL DIST FROM REFERENCE (FEET)	AUDIBLE NOISE (RAIN) L50 DBA	AUDIBLE NOISE (FAIR) L50 DBA	RADIO INTERFERENCE (RAIN) L50 DBUV/M	RADIO INTERFERENCE (FAIR) L50 DBUV/M	TVI TOTAL RAIN DBUV/M	OZONE FOR RAIN RATE OF 1.00 IN/HR AT 0. FT.LEVEL PPB	ELECTRIC FIELD KV/M	MAGNETIC FIELD GAUSS
-200.0	47.6	22.6	49.1	32.1	14.8	.000000	.085	.01588
-195.0	47.7	22.7	49.4	32.4	15.0	.000000	.087	.01662
-190.0	47.8	22.8	49.7	32.7	15.2	.000000	.090	.01741
-185.0	47.9	22.9	49.9	32.9	15.4	.000000	.093	.01826
-180.0	48.0	23.0	50.2	33.2	15.6	.000000	.096	.01917
-175.0	48.2	23.2	50.5	33.5	15.9	.000000	.098	.02015
-170.0	48.3	23.3	50.8	33.8	16.1	.000000	.101	.02121
-165.0	48.4	23.4	51.1	34.1	16.3	.000000	.104	.02234
-160.0	48.5	23.5	51.4	34.4	16.5	.000000	.107	.02356
-155.0	48.7	23.7	51.8	34.8	16.8	.000000	.109	.02488
-150.0	48.8	23.8	52.1	35.1	17.0	.000000	.112	.02631
-145.0	49.0	24.0	52.5	35.5	17.2	.000000	.114	.02786
-140.0	49.1	24.1	52.8	35.8	17.5	.000000	.116	.02955
-135.0	49.2	24.2	53.2	36.2	17.8	.000000	.117	.03138
-130.0	49.4	24.4	53.6	36.6	18.0	.000000	.118	.03337
-125.0	49.5	24.5	54.0	37.0	18.3	.000000	.118	.03555
-120.0	49.7	24.7	54.4	37.4	18.6	.000000	.117	.03793
-115.0	49.9	24.9	54.9	37.9	18.9	.000000	.115	.04054
-110.0	50.0	25.0	55.3	38.3	19.2	.000000	.111	.04341
-105.0	50.2	25.2	55.8	38.8	19.5	.000000	.105	.04656
-100.0	50.4	25.4	56.3	39.3	19.8	.000000	.097	.05002
-95.0	50.6	25.6	56.8	39.8	20.1	.000000	.086	.05385
-90.0	50.8	25.8	57.4	40.4	20.5	.000000	.071	.05807
-85.0	51.0	26.0	58.0	41.0	20.8	.000000	.054	.06274
-80.0	51.2	26.2	58.5	41.5	21.2	.000000	.039	.06790

LATERAL DIST FROM REFERENCE (FEET)	AUDIBLE NOISE (RAIN) L50 DBA	AUDIBLE NOISE (FAIR) L50 DBA	RADIO INTERFERENCE (RAIN) L50 DBUV/M	RADIO INTERFERENCE (FAIR) L50 DBUV/M	TVI TOTAL RAIN DBUV/M	OZONE FOR RAIN RATE OF 1.00 IN/HR AT 0. FT.LEVEL PPB	ELECTRIC FIELD KV/M	MAGNETIC FIELD GAUSS
-75.0	51.4	26.4	59.2	42.2	21.5	.000000	.058	.07361
-70.0	51.6	26.6	59.8	42.8	21.9	.000000	.104	.07993
-65.0	51.8	26.8	60.5	43.5	22.3	.000000	.168	.08690
-60.0	52.1	27.1	61.2	44.2	22.7	.000000	.253	.09456
-55.0	52.3	27.3	61.9	44.9	23.2	.000000	.362	.10295
-50.0	52.6	27.6	62.6	45.6	23.6	.000000	.500	.11206
-45.0	52.8	27.8	63.4	46.4	24.3	.000000	.671	.12184
-40.0	53.1	28.1	64.2	47.2	25.0	.000000	.881	.13216
-35.0	53.4	28.4	65.0	48.0	25.7	.000000	1.133	.14286
-30.0	53.7	28.7	65.8	48.8	26.4	.000000	1.432	.15374
-25.0	54.0	29.0	66.6	49.6	27.3	.000000	1.778	.16468
-20.0	54.3	29.3	67.5	50.5	28.2	.000000	2.176	.17580
-15.0	54.7	29.7	68.6	51.6	29.1	.000000	2.629	.18759
-10.0	55.0	30.0	70.3	53.3	30.2	.000000	3.147	.20086
-5.0	55.3	30.3	72.1	55.1	31.2	.000000	3.727	.21630
.0	55.6	30.6	73.9	56.9	32.3	.000022	4.343	.23370
5.0	55.9	30.9	75.4	58.4	33.3	.000115	4.915	.25125
10.0	56.1	31.1	76.4	59.4	34.0	.000254	5.310	.26541
15.0	56.1	31.1	76.8	59.8	34.2	.000401	5.389	.27219
20.0	56.1	31.1	76.4	59.4	34.0	.000536	5.091	.26924
25.0	55.9	30.9	75.4	58.4	33.3	.008542	4.488	.25721
30.0	55.7	30.7	73.9	56.9	32.3	.078357	3.728	.23901
35.0	55.4	30.4	72.1	55.1	31.2	.170008	2.958	.21798
40.0	55.0	30.0	70.3	53.3	30.2	.241779	2.269	.19666
45.0	54.7	29.7	68.9	51.9	29.1	.297819	1.696	.17651
50.0	54.4	29.4	68.1	51.1	28.2	.344113	1.242	.15819
55.0	54.1	29.1	67.3	50.3	27.3	.382264	.893	.14188
60.0	53.8	28.8	66.5	49.5	26.4	.412707	.630	.12750
65.0	53.5	28.5	65.7	48.7	25.7	.435999	.437	.11489
70.0	53.2	28.2	64.8	47.8	25.0	.452955	.301	.10384
75.0	52.9	27.9	64.0	47.0	24.4	.464513	.214	.09414
80.0	52.7	27.7	63.2	46.2	24.0	.471607	.172	.08562
85.0	52.4	27.4	62.5	45.5	23.5	.475091	.164	.07812
90.0	52.2	27.2	61.7	44.7	23.1	.475709	.172	.07148
95.0	51.9	26.9	61.0	44.0	22.7	.474085	.183	.06560
100.0	51.7	26.7	60.3	43.3	22.3	.470733	.192	.06036
105.0	51.5	26.5	59.7	42.7	21.9	.466068	.199	.05570
110.0	51.2	26.2	59.0	42.0	21.5	.460423	.203	.05152
115.0	51.0	26.0	58.4	41.4	21.1	.454061	.204	.04777
120.0	50.8	25.8	57.8	40.8	20.7	.447193	.203	.04439
125.0	50.6	25.6	57.3	40.3	20.4	.439981	.201	.04135
130.0	50.5	25.5	56.7	39.7	20.1	.432554	.198	.03859
135.0	50.3	25.3	56.2	39.2	19.7	.425012	.193	.03609
140.0	50.1	25.1	55.7	38.7	19.4	.417433	.188	.03381
145.0	49.9	24.9	55.3	38.3	19.1	.409875	.182	.03174
150.0	49.8	24.8	54.8	37.8	18.8	.402385	.177	.02984
155.0	49.6	24.6	54.4	37.4	18.5	.394997	.171	.02810
160.0	49.4	24.4	53.9	36.9	18.2	.387736	.165	.02651
165.0	49.3	24.3	53.5	36.5	18.0	.380620	.159	.02504
170.0	49.1	24.1	53.1	36.1	17.7	.373663	.153	.02369
175.0	49.0	24.0	52.8	35.8	17.4	.366874	.147	.02244
180.0	48.9	23.9	52.4	35.4	17.2	.360259	.142	.02129
185.0	48.7	23.7	52.0	35.0	17.0	.353819	.137	.02022
190.0	48.6	23.6	51.7	34.7	16.7	.347556	.131	.01922
195.0	48.5	23.5	51.4	34.4	16.5	.341469	.127	.01830
200.0	48.3	23.3	51.1	34.1	16.3	.335557	.122	.01744

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***********************************************
*      C O R O N A   A N D   F I E L D      *
*        E F F E C T S   P R O G R A M      *
*   Source: Bonneville Power Administration  *
***********************************************


   +++++++++++++++++++
   + INPUT DATA LIST +

     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
     10/ 9/2013             9:22:54 am
+********  Basin 345/3415kV EMF Calcs  *************10/07/2013*********
+****  Double-Circuit Vertical -- (1)2306.2kcmil ACSR each Ckt     ****
+      1       0       6       8   362.0    2.00    1.00     .00

(ENGLISH UNITS OPTION)

   LINE GRADIENTS COMPUTED BY PROGRAM

PHYSICAL SYSTEM CONSISTS OF   8 CONDUCTORS, OF WHICH   6 ARE ENERGIZED PHASES

+COMB  MF  XX  XX  XX  XX  XX  XX
+   4.921   6.562   9.842    .000   1.000  75.000   3.280   4.000   3.280
+345A1        A   -15.00   80.00    1   1.802     .00  209.00      .0    1.61     .00
+345B1        A   -17.00   55.00    1   1.802     .00  209.00  -120.0    1.65     .00
+345C1        A   -15.00   30.00    1   1.802     .00  209.00   120.0    1.61     .00
+345A2        A    15.00   30.00    1   1.802     .00  209.00      .0    1.65     .00
+345B2        A    17.00   55.00    1   1.802     .00  209.00  -120.0    1.65     .00
+345C2        A    15.00   80.00    1   1.802     .00  209.00   120.0    1.65     .00
+GND1         A    -8.00  110.00    1    .500     .00     .00      .0     .00     .00
+GND2         A     8.00  110.00    1    .500     .00     .00      .0     .00     .00
+       4  -300.0    25.0
+      81  -200.0     5.0
+       4   225.0    25.0
+       0      .0      .0
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COMBINED OUTPUT OF AUDIBLE NOISE, RADIO NOISE, TVI, OZONE CONCENTRATION, GROUND GRADIENT AND MAGNETIC FIELD

```
********  Basin 345/3415kV EMF Calcs  *************10/07/2013*********
****  Double-Circuit Vertical -- (1)2306.2kcmil ACSR each Ckt     ****
```

362.0 KV

	DIST. FROM CENTER OF TOWER (FEET)	HEIGHT (FEET)	MAXIMUM GRADIENT (KV/CM)	SUBCON DIAM. (IN)	NO. OF SUBCON	SUBCON SPACING (IN)	VOLTAGE L-N (KV)	PHASE ANGLE (DEGREES)	CURRENT (KAMPS)	CORONA LOSSES (KW/MI)
345A1	-15.00	80.00	16.01	1.80	1.00	.00	209.00	.00	1.605	30.157
345B1	-17.00	55.00	15.61	1.80	1.00	.00	209.00	-120.00	1.650	25.581
345C1	-15.00	30.00	16.26	1.80	1.00	.00	209.00	120.00	1.605	33.274
345A2	15.00	30.00	16.26	1.80	1.00	.00	209.00	.00	1.650	33.274
345B2	17.00	55.00	15.61	1.80	1.00	.00	209.00	-120.00	1.650	25.581
345C2	15.00	80.00	16.01	1.80	1.00	.00	209.00	120.00	1.650	30.157
GND1	-8.00	110.00	2.27	.50	1.00	.00	.00	.00	.000	.000
GND2	8.00	110.00	2.27	.50	1.00	.00	.00	.00	.000	.000

AN MICROPHONE HT.= 4.9 FT, RI ANT. HT.= 6.6 FT, TV ANT. HT.= 9.8 FT, ALTITUDE=   .0 FT
RI FREQ= 1.000 MHZ, TV FREQ= 75.000 MHZ, WIND VEL.(OZ) = 2.000 MPH, GROUND CONDUCTIVITY =   4.0 MMHOS /M
E-FIELD TRANSDUCER HT.= 3.3FT, B-FIELD TRANSDUCER HT. = 3.3FT

LATERAL DIST FROM REFERENCE (FEET)	AUDIBLE NOISE (RAIN) L50 DBA	AUDIBLE NOISE (FAIR) L50 DBA	RADIO INTERFERENCE (RAIN) L50 DBUV/M	RADIO INTERFERENCE (FAIR) L50 DBUV/M	TVI TOTAL RAIN DBUV/M	OZONE FOR RAIN RATE OF 1.00 IN/HR AT 0. FT.LEVEL PPB	ELECTRIC FIELD KV/M	MAGNETIC FIELD GAUSS
-300.0	50.7	25.7	49.7	32.7	13.4	.000000	.018	.00154
-275.0	51.2	26.2	50.7	33.7	14.7	.000000	.022	.00179
-250.0	51.6	26.6	51.7	34.7	15.5	.000000	.028	.00213
-225.0	52.1	27.1	52.8	35.8	16.5	.000000	.035	.00261
-200.0	52.7	27.7	54.2	37.2	17.6	.000000	.045	.00334
-195.0	52.8	27.8	54.4	37.4	17.8	.000000	.047	.00353
-190.0	52.9	27.9	54.7	37.7	18.1	.000000	.049	.00374
-185.0	53.0	28.0	55.0	38.0	18.3	.000000	.052	.00398
-180.0	53.2	28.2	55.3	38.3	18.6	.000000	.054	.00424
-175.0	53.3	28.3	55.7	38.7	18.8	.000000	.057	.00453
-170.0	53.4	28.4	56.0	39.0	19.1	.000000	.060	.00485
-165.0	53.6	28.6	56.3	39.3	19.4	.000000	.063	.00522
-160.0	53.7	28.7	56.7	39.7	19.7	.000000	.066	.00563
-155.0	53.9	28.9	57.0	40.0	20.0	.000000	.069	.00609
-150.0	54.0	29.0	57.4	40.4	20.3	.000000	.073	.00661
-145.0	54.2	29.2	57.8	40.8	20.6	.000000	.076	.00720

LATERAL DIST	AUDIBLE NOISE		RADIO INTERFERENCE		TVI	OZONE		
FROM	(RAIN)	(FAIR)	(RAIN)	(FAIR)	TOTAL	FOR RAIN RATE OF	ELECTRIC	MAGNETIC
REFERENCE	L50	L50	L50	L50	RAIN	1.00 IN/HR AT 0. FT.LEVEL	FIELD	FIELD
(FEET)	DBA	DBA	DBUV/M	DBUV/M	DBUV/M	PPB	KV/M	GAUSS
-140.0	54.3	29.3	58.2	41.2	21.0	.000000	.080	.00786
-135.0	54.5	29.5	58.6	41.6	21.3	.000000	.083	.00861
-130.0	54.6	29.6	59.0	42.0	21.7	.000000	.086	.00947
-125.0	54.8	29.8	59.4	42.4	22.0	.000000	.090	.01044
-120.0	55.0	30.0	59.9	42.9	22.4	.000000	.093	.01156
-115.0	55.2	30.2	60.3	43.3	22.8	.000000	.097	.01283
-110.0	55.4	30.4	60.8	43.8	23.3	.000000	.101	.01430
-105.0	55.6	30.6	61.3	44.3	23.7	.000000	.106	.01600
-100.0	55.8	30.8	61.7	44.7	24.2	.000000	.114	.01796
-95.0	56.0	31.0	62.2	45.2	24.7	.000000	.125	.02025
-90.0	56.2	31.2	62.7	45.7	25.2	.000000	.142	.02293
-85.0	56.4	31.4	63.2	46.2	25.8	.000000	.169	.02608
-80.0	56.7	31.7	63.7	46.7	26.3	.000000	.209	.02981
-75.0	56.9	31.9	64.2	47.2	27.0	.000000	.268	.03424
-70.0	57.2	32.2	64.7	47.7	27.6	.000000	.352	.03953
-65.0	57.4	32.4	65.2	48.2	28.4	.000000	.467	.04591
-60.0	57.7	32.7	66.4	49.4	29.1	.000000	.624	.05361
-55.0	58.0	33.0	67.9	50.9	30.0	.000000	.835	.06297
-50.0	58.3	33.3	69.5	52.5	30.9	.000000	1.116	.07437
-45.0	58.6	33.6	71.2	54.2	31.8	.000000	1.481	.08824
-40.0	58.9	33.9	73.0	56.0	32.9	.000000	1.940	.10499
-35.0	59.3	34.3	74.8	57.8	33.9	.000000	2.485	.12488
-30.0	59.6	34.6	76.6	59.6	35.0	.000000	3.069	.14775
-25.0	59.9	34.9	78.1	61.1	36.0	.000000	3.589	.17261
-20.0	60.1	35.1	79.1	62.1	36.7	.000000	3.887	.19741
-15.0	60.3	35.3	79.5	62.5	36.9	.000000	3.812	.21933
-10.0	60.4	35.4	79.1	62.1	36.7	.000000	3.326	.23592
-5.0	60.4	35.4	78.1	61.1	36.0	.012246	2.608	.24613
.0	60.5	35.5	76.6	59.6	35.0	.120977	2.174	.25008
5.0	60.4	35.4	78.1	61.1	36.0	.267293	2.608	.24795
10.0	60.4	35.4	79.1	62.1	36.7	.381196	3.326	.23937
15.0	60.3	35.3	79.5	62.5	36.9	.459313	3.812	.22405
20.0	60.1	35.1	79.1	62.1	36.7	.512414	3.887	.20294
25.0	59.9	34.9	78.1	61.1	36.0	.561756	3.589	.17850
30.0	59.6	34.6	76.6	59.6	35.0	.696522	3.069	.15363
35.0	59.3	34.3	74.8	57.8	33.9	.856858	2.485	.13052
40.0	58.9	33.9	73.0	56.0	32.9	.975017	1.940	.11026
45.0	58.6	33.6	71.2	54.2	31.8	1.055529	1.481	.09309
50.0	58.3	33.3	69.5	52.5	30.9	1.111975	1.116	.07880
55.0	58.0	33.0	67.9	50.9	30.0	1.152366	.835	.06700
60.0	57.7	32.7	66.4	49.4	29.1	1.180866	.624	.05727
65.0	57.4	32.4	65.2	48.2	28.4	1.199834	.467	.04922
70.0	57.2	32.2	64.7	47.7	27.6	1.210881	.352	.04254
75.0	56.9	31.9	64.2	47.2	27.0	1.215307	.268	.03697
80.0	56.7	31.7	63.7	46.7	26.3	1.214253	.209	.03229
85.0	56.4	31.4	63.2	46.2	25.8	1.208736	.169	.02835
90.0	56.2	31.2	62.7	45.7	25.2	1.199649	.142	.02500
95.0	56.0	31.0	62.2	45.2	24.7	1.187760	.125	.02215
100.0	55.8	30.8	61.7	44.7	24.2	1.173718	.114	.01970
105.0	55.6	30.6	61.3	44.3	23.7	1.158062	.106	.01759
110.0	55.4	30.4	60.8	43.8	23.3	1.141233	.101	.01576
115.0	55.2	30.2	60.3	43.3	22.8	1.123588	.097	.01418
120.0	55.0	30.0	59.9	42.9	22.4	1.105415	.093	.01279
125.0	54.8	29.8	59.4	42.4	22.0	1.086941	.090	.01158
130.0	54.6	29.6	59.0	42.0	21.7	1.068349	.086	.01051
135.0	54.5	29.5	58.6	41.6	21.3	1.049779	.083	.00957
140.0	54.3	29.3	58.2	41.2	21.0	1.031342	.080	.00874
145.0	54.2	29.2	57.8	40.8	20.6	1.013123	.076	.00800
150.0	54.0	29.0	57.4	40.4	20.3	.995185	.073	.00735
155.0	53.9	28.9	57.0	40.0	20.0	.977576	.069	.00676
160.0	53.7	28.7	56.7	39.7	19.7	.960332	.066	.00623
165.0	53.6	28.6	56.3	39.3	19.4	.943476	.063	.00576
170.0	53.4	28.4	56.0	39.0	19.1	.927025	.060	.00534
175.0	53.3	28.3	55.7	38.7	18.8	.910987	.057	.00495
180.0	53.2	28.2	55.3	38.3	18.6	.895368	.054	.00461
185.0	53.0	28.0	55.0	38.0	18.3	.880168	.052	.00430
190.0	52.9	27.9	54.7	37.7	18.1	.865383	.049	.00401
195.0	52.8	27.8	54.4	37.4	17.8	.851009	.047	.00376
200.0	52.7	27.7	54.2	37.2	17.6	.837038	.045	.00352
225.0	52.1	27.1	52.8	35.8	16.5	.772912	.035	.00264
250.0	51.6	26.6	51.7	34.7	15.5	.717356	.028	.00208
275.0	51.2	26.2	50.7	33.7	14.7	.669040	.022	.00172
300.0	50.7	25.7	49.7	32.7	13.4	.626778	.018	.00147

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**********************************************
*      C O R O N A   A N D   F I E L D      *
*        E F F E C T S   P R O G R A M      *
*   Source: Bonneville Power Administration  *
**********************************************


   +++++++++++++++++++
   + INPUT DATA LIST +

  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
   10/ 9/2013            9:23: 4 am
+********  Basin 345/345kV EMF Calcs  *************10/07/2013*******
+**** (2)Single-Circuit Vertical -- (1)2306.2kcmil ACSR eack ckt ***
+      1       0       6      10   362.0    2.00    1.00     .00

(ENGLISH UNITS OPTION)

   LINE GRADIENTS COMPUTED BY PROGRAM

PHYSICAL SYSTEM CONSISTS OF  10 CONDUCTORS, OF WHICH   6 ARE ENERGIZED PHASES

+COMB  MF  XX  XX  XX  XX  XX  XX
+   4.921   6.562   9.842    .000   1.000  75.000   3.280   4.000   3.280
+345A1        A   -90.00   65.00    1   1.802     .00  209.00      .0    1.65     .00
+345B1        A   -58.00   52.50    1   1.802     .00  209.00  -120.0    1.65     .00
+345C1        A   -92.00   40.00    1   1.802     .00  209.00   120.0    1.65     .00
+345A2        A    60.00   65.00    1   1.802     .00  209.00      .0    1.65     .00
+345B2        A    92.00   52.50    1   1.802     .00  209.00  -120.0    1.65     .00
+345C2        A    58.00   40.00    1   1.802     .00  209.00   120.0    1.65     .00
+GND1         A   -83.00  100.00    1    .500     .00     .00      .0     .00     .00
+GND2         A   -67.00  100.00    1    .500     .00     .00      .0     .00     .00
+GND3         A    67.00  100.00    1    .500     .00     .00      .0     .00     .00
+GND4         A    83.00  100.00    1    .500     .00     .00      .0     .00     .00
+       4  -300.0    25.0
+      81  -200.0     5.0
+       4   225.0    25.0
+       0      .0      .0


COMBINED OUTPUT OF AUDIBLE NOISE, RADIO NOISE, TVI, OZONE CONCENTRATION, GROUND GRADIENT AND MAGNETIC FIELD

 ********  Basin 345/345kV EMF Calcs  *************10/07/2013*******
 **** (2)Single-Circuit Vertical -- (1)2306.2kcmil ACSR eack ckt ***

362.0 KV

             DIST. FROM                MAXIMUM  SUBCON   NO. OF      SUBCON   VOLTAGE  PHASE    CURRENT  CORONA
          CENTER OF TOWER  HEIGHT   GRADIENT  DIAM.   SUBCON      SPACING    L-N    ANGLE              LOSSES
               (FEET)      (FEET)   (KV/CM)   (IN)                (IN)      (KV)  (DEGREES)  (KAMPS)  (KW/MI)

 345A1          -90.00      65.00    15.36     1.80    1.00         .00    209.00      .00    1.650   22.965
 345B1          -58.00      52.50    15.02     1.80    1.00         .00    209.00  -120.00    1.650   19.919
 345C1          -92.00      40.00    15.69     1.80    1.00         .00    209.00   120.00    1.650   26.361
 345A2           60.00      65.00    15.47     1.80    1.00         .00    209.00      .00    1.650   24.042
 345B2           92.00      52.50    14.82     1.80    1.00         .00    209.00  -120.00    1.650   18.206
 345C2           58.00      40.00    15.77     1.80    1.00         .00    209.00   120.00    1.650   27.270
 GND1           -83.00     100.00     3.29      .50    1.00         .00       .00      .00     .000     .000
 GND2           -67.00     100.00     2.52      .50    1.00         .00       .00      .00     .000     .000
 GND3            67.00     100.00     3.10      .50    1.00         .00       .00      .00     .000     .000
 GND4            83.00     100.00     2.58      .50    1.00         .00       .00      .00     .000     .000

AN MICROPHONE HT.=  4.9 FT,  RI ANT. HT.=  6.6 FT,  TV ANT. HT.=  9.8 FT, ALTITUDE=      .0 FT
RI FREQ=  1.000 MHZ, TV FREQ=  75.000 MHZ, WIND VEL.(OZ) =  2.000 MPH, GROUND CONDUCTIVITY =   4.0 MMHOS  /M
E-FIELD TRANSDUCER HT.=  3.3FT,  B-FIELD TRANSDUCER HT. =  3.3FT

 LATERAL DIST    AUDIBLE NOISE   RADIO INTERFERENCE     TVI            OZONE
     FROM       (RAIN)   (FAIR)   (RAIN)    (FAIR)      TOTAL       FOR RAIN RATE OF      ELECTRIC    MAGNETIC
   REFERENCE     L50      L50      L50       L50        RAIN     1.00 IN/HR AT 0. FT.LEVEL  FIELD       FIELD
    (FEET)       DBA      DBA     DBUV/M    DBUV/M     DBUV/M              PPB              KV/M       GAUSS
    -300.0       49.2     24.2     49.1      32.1       14.7            .000000             .085     .00909
    -275.0       49.7     24.7     50.5      33.5       15.8            .000000             .109     .01110
    -250.0       50.3     25.3     52.1      35.1       17.0            .000000             .144     .01388
    -225.0       50.9     25.9     54.0      37.0       18.4            .000000             .197     .01790
    -200.0       51.7     26.7     56.3      39.3       20.1            .000000             .283     .02407
    -195.0       51.8     26.8     56.8      39.8       20.5            .000000             .307     .02570
    -190.0       52.0     27.0     57.3      40.3       20.9            .000000             .333     .02750
    -185.0       52.2     27.2     57.8      40.8       21.3            .000000             .363     .02951
    -180.0       52.3     27.3     58.4      41.4       21.8            .000000             .398     .03176
    -175.0       52.5     27.5     59.0      42.0       22.2            .000000             .437     .03428
    -170.0       52.7     27.7     59.6      42.6       22.7            .000000             .482     .03711
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LATERAL DIST FROM REFERENCE (FEET)	AUDIBLE NOISE (RAIN) L50 DBA	AUDIBLE NOISE (FAIR) L50 DBA	RADIO INTERFERENCE (RAIN) L50 DBUV/M	RADIO INTERFERENCE (FAIR) L50 DBUV/M	TVI TOTAL RAIN DBUV/M	OZONE FOR RAIN RATE OF 1.00 IN/HR AT 0. FT.LEVEL PPB	ELECTRIC FIELD KV/M	MAGNETIC FIELD GAUSS
-165.0	52.9	27.9	60.2	43.2	23.2	.000000	.535	.04031
-160.0	53.1	28.1	60.8	43.8	23.7	.000000	.598	.04394
-155.0	53.3	28.3	61.5	44.5	24.3	.000000	.671	.04807
-150.0	53.5	28.5	62.6	45.6	24.8	.000000	.760	.05276
-145.0	53.8	28.8	63.6	46.6	25.4	.000000	.867	.05812
-140.0	54.0	29.0	64.7	47.7	26.1	.000000	.998	.06422
-135.0	54.3	29.3	65.9	48.9	26.7	.000000	1.156	.07116
-130.0	54.5	29.5	67.1	50.1	27.4	.000000	1.346	.07901
-125.0	54.8	29.8	68.4	51.4	28.1	.000000	1.570	.08779
-120.0	55.0	30.0	69.6	52.6	28.8	.000000	1.827	.09747
-115.0	55.2	30.2	70.8	53.8	29.6	.000000	2.105	.10788
-110.0	55.5	30.5	71.9	54.9	30.2	.000000	2.383	.11867
-105.0	55.7	30.7	72.9	55.9	30.8	.000000	2.625	.12926
-100.0	55.9	30.9	73.6	56.6	31.2	.000000	2.785	.13887
-95.0	56.0	31.0	74.0	57.0	31.5	.000000	2.819	.14661
-90.0	56.0	31.0	74.0	57.0	31.5	.000000	2.702	.15171
-85.0	56.1	31.1	73.7	56.7	31.3	.000000	2.441	.15373
-80.0	56.1	31.1	73.1	56.1	30.9	.001280	2.086	.15262
-75.0	56.0	31.0	72.1	55.1	30.3	.022876	1.717	.14872
-70.0	55.9	30.9	71.0	54.0	29.7	.073763	1.438	.14253
-65.0	55.8	30.8	69.8	52.8	29.0	.131702	1.332	.13459
-60.0	55.7	30.7	68.8	51.8	28.3	.183752	1.377	.12541
-55.0	55.6	30.6	68.8	51.8	27.6	.227224	1.472	.11546
-50.0	55.5	30.5	68.6	51.6	26.9	.262140	1.543	.10518
-45.0	55.4	30.4	68.2	51.2	26.2	.289142	1.557	.09494
-40.0	55.3	30.3	67.7	50.7	25.6	.310539	1.511	.08509
-35.0	55.2	30.2	67.0	50.0	25.2	.333126	1.414	.07590
-30.0	55.2	30.2	66.2	49.2	24.7	.359676	1.277	.06758
-25.0	55.1	30.1	65.4	48.4	24.2	.386423	1.114	.06031
-20.0	55.0	30.0	64.5	47.5	23.7	.409437	.936	.05424
-15.0	55.0	30.0	63.7	46.7	23.5	.426992	.750	.04952
-10.0	55.0	30.0	62.8	45.8	24.0	.439014	.562	.04630
-5.0	55.0	30.0	61.9	44.9	24.5	.446194	.378	.04473
.0	55.0	30.0	62.8	45.8	25.1	.449439	.214	.04486
5.0	55.1	30.1	63.9	46.9	25.7	.449619	.210	.04669
10.0	55.2	30.2	65.0	48.0	26.3	.447475	.396	.05010
15.0	55.3	30.3	66.2	49.2	27.0	.443608	.626	.05503
20.0	55.4	30.4	67.4	50.4	27.7	.438487	.889	.06140
25.0	55.5	30.5	68.6	51.6	28.4	.432474	1.182	.06916
30.0	55.6	30.6	69.9	52.9	29.1	.425847	1.499	.07827
35.0	55.8	30.8	71.1	54.1	29.8	.418815	1.832	.08857
40.0	55.9	30.9	72.2	55.2	30.5	.411536	2.156	.09980
45.0	56.1	31.1	73.2	56.2	31.1	.404131	2.438	.11147
50.0	56.1	31.1	73.9	56.9	31.5	.396689	2.633	.12288
55.0	56.2	31.2	74.3	57.3	31.8	.389276	2.696	.13316
60.0	56.2	31.2	74.3	57.3	31.8	.381941	2.605	.14148
65.0	56.2	31.2	74.0	57.0	31.6	.374721	2.370	.14724
70.0	56.1	31.1	73.3	56.3	31.2	.368979	2.045	.15020
75.0	55.9	30.9	72.4	55.4	30.6	.384632	1.718	.15045
80.0	55.8	30.8	71.3	54.3	30.0	.431076	1.498	.14831
85.0	55.6	30.6	70.1	53.1	29.3	.485105	1.457	.14415
90.0	55.4	30.4	68.9	51.9	28.5	.533241	1.551	.13836
95.0	55.2	30.2	68.1	51.1	27.8	.572678	1.680	.13132
100.0	55.0	30.0	67.9	50.9	27.1	.603403	1.779	.12340
105.0	54.8	29.8	67.5	50.5	26.5	.626042	1.823	.11498
110.0	54.6	29.6	66.9	49.9	25.8	.642762	1.809	.10639
115.0	54.3	29.3	66.3	49.3	25.2	.659758	1.747	.09792
120.0	54.1	29.1	65.5	48.5	24.6	.679654	1.651	.08979
125.0	53.9	28.9	64.7	47.7	24.1	.699254	1.535	.08214
130.0	53.7	28.7	63.8	46.8	23.6	.715193	1.409	.07507
135.0	53.5	28.5	62.9	45.9	23.1	.726045	1.282	.06861
140.0	53.2	28.2	62.1	45.1	22.6	.731833	1.159	.06275
145.0	53.0	28.0	61.2	44.2	22.1	.733237	1.045	.05747
150.0	52.8	27.8	60.4	43.4	21.7	.731116	.939	.05272
155.0	52.7	27.7	59.5	42.5	21.3	.726283	.844	.04847
160.0	52.5	27.5	58.7	41.7	20.9	.719427	.759	.04465
165.0	52.3	27.3	58.0	41.0	20.5	.711104	.683	.04123
170.0	52.1	27.1	57.2	40.2	20.1	.701746	.615	.03816
175.0	51.9	26.9	56.5	39.5	19.8	.691687	.555	.03541
180.0	51.8	26.8	55.8	38.8	19.4	.681181	.503	.03292
185.0	51.6	26.6	55.2	38.2	19.1	.670420	.456	.03068
190.0	51.5	26.5	54.8	37.8	18.8	.659547	.414	.02865
195.0	51.3	26.3	54.4	37.4	18.5	.648670	.378	.02682
200.0	51.2	26.2	54.0	37.0	18.2	.637867	.345	.02515
225.0	50.5	25.5	52.1	35.1	16.8	.586538	.229	.01873
250.0	49.9	24.9	50.6	33.6	15.6	.541180	.160	.01450
275.0	49.4	24.4	49.2	32.2	14.6	.501834	.118	.01156
300.0	49.0	24.0	48.0	31.0	13.7	.467742	.090	.00944

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***********************************************
*       C O R O N A   A N D   F I E L D      *
*         E F F E C T S   P R O G R A M      *
*   Source: Bonneville Power Administration   *
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  +++++++++++++++++++
  + INPUT DATA LIST +

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
   10/ 9/2013            9:23:15 am
+********  Basin 345/345kV EMF Calcs  *************10/07/2013*******
+**** (2)Single-Circuit H-Frame -- (1)2306.2kcmil ACSR eack ckt ***
+      1       0       6      10   362.0    2.00    1.00     .00

(ENGLISH UNITS OPTION)

   LINE GRADIENTS COMPUTED BY PROGRAM

PHYSICAL SYSTEM CONSISTS OF  10 CONDUCTORS, OF WHICH   6 ARE ENERGIZED PHASES

+COMB  MF  XX  XX  XX  XX  XX  XX
+   4.921   6.562   9.842    .000   1.000  75.000   3.280   4.000   3.280
+345A1        A  -103.00   42.00    1   1.802     .00  209.00      .0    1.65     .00
+345B1        A   -75.00   42.00    1   1.802     .00  209.00  -120.0    1.65     .00
+345C1        A   -47.00   42.00    1   1.802     .00  209.00   120.0    1.65     .00
+345A2        A    47.00   42.00    1   1.802     .00  209.00      .0    1.65     .00
+345B2        A    75.00   42.00    1   1.802     .00  209.00  -120.0    1.65     .00
+345C2        A   103.00   42.00    1   1.802     .00  209.00   120.0    1.65     .00
+GND1         A   -93.00   75.00    1    .500     .00     .00      .0     .00     .00
+GND2         A   -57.00   75.00    1    .500     .00     .00      .0     .00     .00
+GND3         A    57.00   75.00    1    .500     .00     .00      .0     .00     .00
+GND4         A    93.00   75.00    1    .500     .00     .00      .0     .00     .00
+       4  -300.0    25.0
+      81  -200.0     5.0
+       4   225.0    25.0
+       0      .0      .0
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COMBINED OUTPUT OF AUDIBLE NOISE, RADIO NOISE, TVI, OZONE CONCENTRATION, GROUND GRADIENT AND MAGNETIC FIELD

******** Basin 345/345kV EMF Calcs *************10/07/2013*******
**** (2)Single-Circuit H-Frame -- (1)2306.2kcmil ACSR eack ckt ***

362.0 KV

	DIST. FROM CENTER OF TOWER (FEET)	HEIGHT (FEET)	MAXIMUM GRADIENT (KV/CM)	SUBCON DIAM. (IN)	NO. OF SUBCON	SUBCON SPACING (IN)	VOLTAGE L-N (KV)	PHASE ANGLE (DEGREES)	CURRENT (KAMPS)	CORONA LOSSES (KW/MI)
345A1	-103.00	42.00	14.87	1.80	1.00	.00	209.00	.00	1.650	18.596
345B1	-75.00	42.00	15.81	1.80	1.00	.00	209.00	-120.00	1.650	27.757
345C1	-47.00	42.00	15.06	1.80	1.00	.00	209.00	120.00	1.650	20.267
345A2	47.00	42.00	15.06	1.80	1.00	.00	209.00	.00	1.650	20.267
345B2	75.00	42.00	15.81	1.80	1.00	.00	209.00	-120.00	1.650	27.757
345C2	103.00	42.00	14.87	1.80	1.00	.00	209.00	120.00	1.650	18.596
GND1	-93.00	75.00	2.87	.50	1.00	.00	.00	.00	.000	.000
GND2	-57.00	75.00	1.90	.50	1.00	.00	.00	.00	.000	.000
GND3	57.00	75.00	1.90	.50	1.00	.00	.00	.00	.000	.000
GND4	93.00	75.00	2.87	.50	1.00	.00	.00	.00	.000	.000

AN MICROPHONE HT.= 4.9 FT, RI ANT. HT.= 6.6 FT, TV ANT. HT.= 9.8 FT, ALTITUDE=   .0 FT
RI FREQ= 1.000 MHZ, TV FREQ= 75.000 MHZ, WIND VEL.(OZ) = 2.000 MPH, GROUND CONDUCTIVITY =   4.0 MMHOS /M
E-FIELD TRANSDUCER HT.= 3.3FT, B-FIELD TRANSDUCER HT. = 3.3FT

LATERAL DIST FROM REFERENCE (FEET)	AUDIBLE NOISE (RAIN) L50 DBA	AUDIBLE NOISE (FAIR) L50 DBA	RADIO INTERFERENCE (RAIN) L50 DBUV/M	RADIO INTERFERENCE (FAIR) L50 DBUV/M	TVI TOTAL RAIN DBUV/M	OZONE FOR RAIN RATE OF 1.00 IN/HR AT 0. FT.LEVEL PPB	ELECTRIC FIELD KV/M	MAGNETIC FIELD GAUSS
-300.0	48.9	23.9	46.3	29.3	14.4	.000000	.084	.01393
-275.0	49.4	24.4	47.7	30.7	15.4	.000000	.116	.01713
-250.0	49.9	24.9	49.2	32.2	16.5	.000000	.167	.02163
-225.0	50.5	25.5	51.1	34.1	17.8	.000000	.254	.02826
-200.0	51.3	26.3	53.5	36.5	19.3	.000000	.412	.03860
-195.0	51.4	26.4	54.2	37.2	19.7	.000000	.459	.04136
-190.0	51.6	26.6	54.9	37.9	20.0	.000000	.512	.04443
-185.0	51.8	26.8	55.7	38.7	20.4	.000000	.574	.04785
-180.0	51.9	26.9	56.5	39.5	20.7	.000000	.645	.05167
-175.0	52.1	27.1	57.3	40.3	21.1	.000000	.728	.05597
-170.0	52.3	27.3	58.2	41.2	21.5	.000000	.825	.06081

LATERAL DIST FROM REFERENCE (FEET)	AUDIBLE NOISE (RAIN) L50 DBA	AUDIBLE NOISE (FAIR) L50 DBA	RADIO INTERFERENCE (RAIN) L50 DBUV/M	RADIO INTERFERENCE (FAIR) L50 DBUV/M	TVI TOTAL RAIN DBUV/M	OZONE FOR RAIN RATE OF 1.00 IN/HR AT 0. FT.LEVEL PPB	ELECTRIC FIELD KV/M	MAGNETIC FIELD GAUSS
-165.0	52.5	27.5	59.1	42.1	21.9	.000000	.938	.06628
-160.0	52.7	27.7	60.1	43.1	22.4	.000000	1.068	.07247
-155.0	53.0	28.0	61.2	44.2	22.8	.000000	1.220	.07948
-150.0	53.2	28.2	62.3	45.3	23.3	.000000	1.396	.08743
-145.0	53.4	28.4	63.4	46.4	23.9	.000000	1.596	.09643
-140.0	53.7	28.7	64.5	47.5	24.5	.000000	1.821	.10657
-135.0	53.9	28.9	65.7	48.7	25.2	.000000	2.067	.11790
-130.0	54.2	29.2	66.9	49.9	25.9	.000000	2.325	.13039
-125.0	54.5	29.5	68.0	51.0	26.5	.000000	2.578	.14385
-120.0	54.7	29.7	69.0	52.0	27.1	.000000	2.801	.15792
-115.0	55.0	30.0	69.8	52.8	27.6	.000000	2.959	.17197
-110.0	55.2	30.2	70.4	53.4	28.0	.000000	3.016	.18517
-105.0	55.4	30.4	70.7	53.7	28.7	.000000	2.943	.19658
-100.0	55.6	30.6	70.7	53.7	29.3	.000000	2.740	.20541
-95.0	55.8	30.8	71.6	54.6	30.0	.000000	2.435	.21122
-90.0	56.0	31.0	72.5	55.5	30.5	.000964	2.092	.21404
-85.0	56.1	31.1	73.3	56.3	31.0	.013570	1.788	.21440
-80.0	56.2	31.2	73.8	56.8	31.3	.042022	1.579	.21308
-75.0	56.3	31.3	73.9	56.9	31.4	.073931	1.478	.21082
-70.0	56.3	31.3	73.8	56.8	31.3	.100555	1.483	.20788
-65.0	56.3	31.3	73.3	56.3	31.0	.119804	1.615	.20393
-60.0	56.2	31.2	72.5	55.5	30.5	.138764	1.867	.19835
-55.0	56.2	31.2	71.6	54.6	30.0	.179902	2.175	.19056
-50.0	56.1	31.1	71.3	54.3	29.3	.236862	2.449	.18036
-45.0	56.0	31.0	71.4	54.4	28.9	.289608	2.620	.16799
-40.0	55.8	30.8	71.1	54.1	28.7	.329282	2.653	.15410
-35.0	55.7	30.7	70.5	53.5	28.3	.355954	2.550	.13958
-30.0	55.6	30.6	69.7	52.7	27.8	.381583	2.339	.12534
-25.0	55.5	30.5	68.7	51.7	27.2	.418198	2.057	.11216
-20.0	55.4	30.4	67.6	50.6	26.6	.456007	1.741	.10062
-15.0	55.3	30.3	66.4	49.4	25.9	.485324	1.422	.09115
-10.0	55.2	30.2	65.2	48.2	25.2	.503883	1.131	.08406
-5.0	55.2	30.2	64.1	47.1	24.6	.513119	.907	.07964
.0	55.1	30.1	63.0	46.0	23.9	.515326	.815	.07814
5.0	55.2	30.2	64.1	47.1	24.6	.512578	.907	.07964
10.0	55.2	30.2	65.2	48.2	25.2	.506478	1.131	.08406
15.0	55.3	30.3	66.4	49.4	25.9	.498191	1.422	.09115
20.0	55.4	30.4	67.6	50.6	26.6	.488537	1.741	.10062
25.0	55.5	30.5	68.7	51.7	27.2	.478088	2.057	.11216
30.0	55.6	30.6	69.7	52.7	27.8	.467235	2.339	.12534
35.0	55.7	30.7	70.5	53.5	28.3	.456249	2.550	.13958
40.0	55.8	30.8	71.1	54.1	28.7	.445312	2.653	.15410
45.0	56.0	31.0	71.4	54.4	28.9	.434545	2.620	.16799
50.0	56.1	31.1	71.3	54.3	29.3	.424029	2.449	.18036
55.0	56.2	31.2	71.6	54.6	30.0	.413813	2.175	.19056
60.0	56.2	31.2	72.5	55.5	30.5	.405006	1.867	.19835
65.0	56.3	31.3	73.3	56.3	31.0	.409574	1.615	.20393
70.0	56.3	31.3	73.8	56.8	31.3	.432228	1.483	.20788
75.0	56.3	31.3	73.9	56.9	31.4	.459100	1.478	.21082
80.0	56.2	31.2	73.8	56.8	31.3	.480400	1.579	.21308
85.0	56.1	31.1	73.3	56.3	31.0	.493776	1.788	.21440
90.0	56.0	31.0	72.5	55.5	30.5	.506402	2.092	.21404
95.0	55.8	30.8	71.6	54.6	30.0	.540915	2.435	.21122
100.0	55.6	30.6	70.7	53.7	29.3	.591115	2.740	.20541
105.0	55.4	30.4	70.7	53.7	28.7	.637084	2.943	.19658
110.0	55.2	30.2	70.4	53.4	28.0	.670048	3.016	.18517
115.0	55.0	30.0	69.8	52.8	27.6	.690085	2.959	.17197
120.0	54.7	29.7	69.0	52.0	27.1	.708190	2.801	.15792
125.0	54.5	29.5	68.0	51.0	26.5	.735436	2.578	.14385
130.0	54.2	29.2	66.9	49.9	25.9	.763340	2.325	.13039
135.0	53.9	28.9	65.7	48.7	25.2	.783442	2.067	.11790
140.0	53.7	28.7	64.5	47.5	24.5	.793851	1.821	.10657
145.0	53.4	28.4	63.4	46.4	23.9	.795944	1.596	.09643
150.0	53.2	28.2	62.3	45.3	23.3	.791831	1.396	.08743
155.0	53.0	28.0	61.2	44.2	22.8	.783407	1.220	.07948
160.0	52.7	27.7	60.1	43.1	22.4	.772129	1.068	.07247
165.0	52.5	27.5	59.1	42.1	21.9	.759053	.938	.06628
170.0	52.3	27.3	58.2	41.2	21.5	.744920	.825	.06081
175.0	52.1	27.1	57.3	40.3	21.1	.730243	.728	.05597
180.0	51.9	26.9	56.5	39.5	20.7	.715374	.645	.05167
185.0	51.8	26.8	55.7	38.7	20.4	.700551	.574	.04785
190.0	51.6	26.6	54.9	37.9	20.0	.685932	.512	.04443
195.0	51.4	26.4	54.2	37.2	19.7	.671623	.459	.04136
200.0	51.3	26.3	53.5	36.5	19.3	.657689	.412	.03860
225.0	50.5	25.5	51.1	34.1	17.8	.594484	.254	.02826
250.0	49.9	24.9	49.2	32.2	16.5	.541769	.167	.02163
275.0	49.4	24.4	47.7	30.7	15.4	.497797	.116	.01713
300.0	48.9	23.9	46.3	29.3	14.4	.460746	.084	.01393